The Naval Annual

Edited by VISCOUNT [illegible]

1913.

J. GRIFFIN AND CO.,

2, THE HARD, PORTSMOUTH.

(BOOKSELLERS TO HER LATE MAJESTY QUEEN VICTORIA.)

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NAVAL ANNUAL,

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EDITED BY

VISCOUNT HYTHE, D.C.L., A.I.N.A.,

Honorary Fellow of Balliol; Commander of the Order of the Crown of Italy.

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PREFACE.

The growing recognition by the Oversea Dominions of their responsibilities in relation to Imperial Defence is probably the most noteworthy feature of the year reviewed in these pages. Of all our Oversea Dominions Canada has the greatest future before her. She possesses a vast territory with great natural resources. Her population and wealth are increasing very rapidly, and it is not impossible that before the close of the present century the former will be equal to, if not greater than, that of the United Kingdom. The present Government of Canada, under the leadership of Mr. Borden, recognises fully the duty of Canada to play her part in the general defence of the Empire; and though the party in opposition may not absolutely agree with Mr. Borden as to methods, the recognition is becoming general. Australia and New Zealand have great possibilities of development before them. After a period of stagnation, the population of Australia is again growing under the encouragement of the Commonwealth and Colonial Governments, and nothing will conduce more to the security of the Empire in Eastern waters and in the Pacific than the settlement of a numerous population of British race in her unoccupied areas. South Africa has not the same possibilities of development as Canada or even Australia, but there is no reason why she should not support a considerable white population. In South Africa, as well as in Australia and New Zealand, the duty of co-operating in the general defence of the Empire is being increasingly recognised. The gift of a battleship to the British Navy by the Malay States is significant. It shows that even the Dominions which are inhabited by native races are beginning to appreciate the value to them of the protection of the Imperial Navy. The subject of the Dominions and Imperial Defence is dealt with in these pages by the Editor, who has visited most of our important Oversea Dominions more than once in the last twenty-five years. The prospects of the British Empire remaining united and holding its own on the sea against all comers have brightened during the year under review.

The present volume contains a rather larger number of contributed articles than usual. Admiral Sir Reginald Custance's paper on "The

Principles Governing the use of Armour and Guns" is deserving of special consideration at a moment when the increase in the calibre of guns, in thickness of armour, and in speed, are leading to ever increased dimensions. Some of the battleships now under construction have nearly twice the displacement of the Dreadnought, and far larger displacements to carry even larger guns are being discussed. Sir Reginald Custance considers that the 12-in. gun, which has held its own for many years, is large enough for the main armament of battleships, and some may think that the increase in calibre to 15 in. or more, with a reduction in numbers carried, may prove as great a mistake as the adoption of the 80-ton muzzle-loaders of the Inflexible or the 110-ton guns of the Benbow. Captain von Kühlwetter, of the Imperial German Navy, now on the retired list, gives a very full account of the sources of supply and the training of both officers and men. Naval aeronautics are dealt with for the first time in the *Naval Annual*, and a list of the air fleets of the various Powers has been added to Part II. Mr. Leyland, in addition to taking sole responsibility for the review of the progress of foreign Navies, contributes an interesting paper on "The Spirit of the German Navy Law," which should assist to a better comprehension in England of the aims of German Naval policy. The relations between Germany and this country have much improved during the past year. Mr. Richardson has relieved the Editor by reviewing the progress of the British Navy, in addition to contributing his usual paper on problems connected with warship machinery. The project of constructing a ship canal from the Forth, viâ Loch Lomond, to the Clyde is discussed by Captain Hamilton Currey. Any possible strategic advantages would hardly seem to justify the cost. Captain Robinson concludes his account of the events of the Turco-Italian war in which the Navy played a part, and remains responsible for the section dealing with armour and ordnance. The lists and plans of ships remain in the same hands as last year. Part IV., in addition to the usual matter, contains four important memoranda issued by the First Lord and the Admiralty and a translation of the latest Amendment to the German Naval Law.

The Editor cannot conclude this Preface to the *Naval Annual* of 1913 without referring to the death of Sir William White. Sir William White's long tenure of the post of Director of Naval Construction was of immense value to the Navy, and the services which he has rendered to his country since his retirement are hardly less great. By his death the *Naval Annual* loses a frequent and valued contributor, and the Editor an old and esteemed friend whose counsel he never sought in vain.

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PART I.

CHAPTER I.

BRITISH NAVY.

THE year has been full of incident in the Navy from the standpoints alike of *personnel* and *matériel*. The King has continued to show, as a seaman by training, his abiding interest in the Fleet and all that affects its well-being. His Majesty spent four days in May, 1912, with the Home Fleet off the south coast—eighty-nine vessels being present—witnessing evolutions, gun firing, attacks by submarine craft, in one of which he made a trip, and flights by aeroplanes from the deck of the Hibernia; before leaving he expressed his "satisfaction at finding the Fleet in such a high state of efficiency." The Members of Parliament in July visited a fleet of nearly 200 ships of all types anchored in review order at Spithead, and saw the hydro-aeroplanes and submarines at work, followed by the departure of the whole Fleet for the manœuvres. The sight may have awakened consciousness of the need for a dominant Navy. Certainly there is, on the part of the public, a more complacent acceptance of the financial burden of sea supremacy, and this has been fostered by the repeated exordiums of the First Lord of the Admiralty on this topic. But against this there is some suspicion that there is still reluctance on the part of the Treasury to provide all the money that the circumstances demand. The Colonies meanwhile have set a noble example in patriotic sacrifice; their action must have far-reaching effect not only on the constitution of Fleets but even on administration and in the Councils of the Empire.

The Board of Admiralty.

In December it was announced that Admiral Sir Francis Bridgeman had resigned his position as First Sea Lord. The circumstances in which Sir Francis, a most capable and distinguished officer, in whom the public placed full reliance, left the Admiralty were fully explained in the House of Commons on December 20, 1912. On December 9th Admiral H.S.H. Prince Louis of Battenberg became First Sea Lord and Admiral Sir John Jellicoe Second Sea Lord. The Third Sea Lord is now Rear-Admiral A. G. H. W. Moore, who succeeded Rear-Admiral Charles J. Briggs on May 29th. The other

members of the Board continue as before—the Fourth Sea Lord being Captain William C. Pakenham, the Civil Lord the Right Hon. George Lambert, M.P., the additional Civil Lord the Right Hon. Sir Francis J. S. Hopwood, the Parliamentary and Financial Secretary the Right Hon. T. J. Macnamara, and the Permanent Secretary Sir W. Graham Greene.

The reorganisation of the Controller's Department.

In October there came into effect a reorganisation of the Controller's Department as a measure complementary to the appointment at the beginning of 1912 of an additional Civil Lord to conduct the business and commercial transactions of the Board. Formerly the three spheres of activity of the Controller's Department were design, constructive and repair work at the dockyards, and contract work. Everything affecting design, new inventions, and the preparing of estimates of the first cost of all new construction is now placed in the charge of the Third Sea Lord, who takes the place on the Board of the Controller—an office no longer existent. Contracts and constructional work, whether in the Royal Dockyards or private works, come within the control of the Additional Civil Lord; but the tenders for new work are to be "marked" to the Third Sea Lord, who also superintends the "heads" of the technical departments. An addition has been made to these in the person of a Director of Naval Equipment. Simply expressed the Controller's Department has been divided in two—the one part being now under the Third Sea Lord and the other under the additional Civil Lord. In many cases there is overlapping of work between the two and between the Director of Naval Equipment and the other technical officers, but with tact and discretion no trouble need arise as to lines of demarcation. More power has been given to each of the technical officers—the Director of Naval Construction, Engineer-in-Chief, Directors of Dockyards, of Works, of Naval Equipment, of Naval Ordnance, and of Air Department and Superintendent of Compasses. The Third Sea Lord, with the Director of Naval Equipment, will have more time to visit works and ships in progress and completed, and thus be able more promptly to decide upon questions arising from time to time so that big operations should be expedited. Moreover, more experience will be gained by observations on ships in commission for the evolution of improvements in design. It may be added that Rear-Admiral A. W. Waymouth is the Director of Naval Equipment, while Rear-Admiral F. C. Tudor has become Director of Naval Ordnance, following Admiral Moore; Mr. E. H. Tennyson d'Eyncourt, formerly at Elswick, has succeeded as Director of Naval Construction Sir Philip Watts, who is retained in the position of Adviser on Naval Construction to the Board. Mr. T. Sims takes the place of Col. Sir

Edward Raban as Director of Works, and Mr. W. H. Whiting that of Sir William Smith as Superintendent of Contract Work. A Permanent Committee on Finance has also been appointed and includes the Parliamentary and Financial Secretary (President), the additional Civil Lord, the Secretary or Assistant Secretary of the Admiralty, the Accountant General, and the Assistant Secretary for Finance Duties.

The War Staff.

The organisation of the War Staff, the formation of which was referred to in last year's *Naval Annual*, has been satisfactorily completed, and has met with general acceptance in the Service. As Chief of the Staff, Rear-Admiral Ernest C. T. Troubridge, having been given a command afloat, has been succeeded by Vice-Admiral Sir Henry B. Jackson. The first War Staff course has been completed, and the officers who passed through it are being employed afloat. A number of other officers have been placed on the staff without qualifying to fill War Staff appointments. A second class, consisting of twelve Naval and three Marine officers, began the course at the end of January. A series of lectures on international law and prize manual, merchant shipping and court-martial procedure, supplemented by instruction in the principles of strategy and tactics, has been started at the Branch War Colleges at Devonport and Chatham.

Fleet distribution.

The redistribution of the Fleet has been effected, but the strength of the several squadrons has not been augmented to the desired extent as expeditiously as was anticipated, owing to the late delivery of many new ships. To this latter subject reference will be made presently, while the composition of the new fleets naturally falls to be considered in Chapter III. on the Comparative Strength of Navies.

Armoured ships completed 1912–13.

During the financial year 1912–13 there were commissioned four battleships and three battle-cruisers, including the New Zealand, but excluding the Australia. This number of seven capital ships compares with four commissioned in the previous year and two in 1910–11. Thus in three years only thirteen armoured vessels were added to the Fleet, notwithstanding that there were included in this period the four extra ships promised in the Navy programme of 1909–10 in the event of a certain condition arising, which contingency did arise. Thus we have maintained the rate of four armoured ships commissioned per annum pronounced some years ago as necessary to meet the necessities of that period, but these necessities have become greatly intensified in later years. There are in various stages of construction in the Royal and private yards eleven battleships and three battle-cruisers, including the Australia. Six

of the fourteen are to be completed within the next year, and eight in the financial year ending March, 1915; but, as will presently be shown, extreme difficulty is experienced in maintaining specified dates for delivery. There is also the battleship Malaya, ordered on February 5th, and to be completed by March, 1915.

Smaller ships completed.

In addition to the armoured ships, there were commissioned in 1912–13 four light cruisers, excluding one for Australia, fifteen torpedo-boat destroyers, three submarine boats, a depôt ship and two tenders for submarine boats, and a surveying vessel. Thus, if the year's work were representative, the complete list would be accepted generally as satisfactory, except, perhaps, in respect of light cruisers and submarine boats; but there are included many ships delayed from previous years.

Delay in construction.

Unfortunately, too, the causes contributing to this result are still operative in a marked degree. Some of these are inevitable, and should be allowed for in fixing the dates for the laying down of ships with regard to the time when they require to take their place in the Fleet. Hitherto, two years have been allowed for the building of capital ships, and the contract conditions imposed a penalty of £100 per day for delay beyond the two years specified. But strikes, which directly or indirectly affect operations in the contractors' work, nullify the penalty clause. Some effort is being made to limit the operation of the strike clause in contracts, but it is doubtful if the result will be attained. Labour disputes, resulting in cessation of work, there will always be, and these must be accepted like the emergencies provided for in all engineering works where forces of nature tend to delay operations, if not to increase their cost. Added recently to labour troubles there has been a shortage of experienced workers. The proportion of apprentices to journeymen has been limited by trade unions without reference to actuarial basis; the "wastage" in workers by natural causes is not fully met. Moreover, during the period of dull trade from which we have recently emerged, many trained workers emigrated to the colonies, notably to Canada, there to take up agriculture if employment in factories was not available. A further cause of delay is the short time worked by certain classes of employés. In some cases the hours average thirty-six instead of fifty-two hours per week. This is a serious drawback from the economic point of view also, since it affects the relation of work done to capital and establishment working charges. But that is another question.

Discipline of Dockyard workers.

The table on the opposite page gives the date of the laying of the keel and of the commissioning of seven vessels passed into the Fleet during the past twelve months. Only in the case of King George V. has the

TIME OCCUPIED IN BUILDING CAPITAL SHIPS COMMISSIONED IN 1912–13.

Type and Name of Ship.	Keel laid.	Date of Commission.	Time occupied.
Battleship Monarch . . .	April 1, 1910 .	April 27, 1912 .	2 years 1 month
„ Thunderer . . .	April 13, 1910 .	June 15, 1912 .	2 years 2 months
„ King George V. .	Jan. 16, 1911 .	Nov. 16, 1912 .	1 year 10 months
„ Conqueror . . .	April 5, 1910 .	March, 1913 .	2 years 11 months
Battle-cruiser Lion . . .	Nov. 29, 1909 .	June 4, 1912 .	2 years 6 months
„ Princess Royal	May 2, 1910 .	Nov. 14, 1912 .	2 years 6 months
„ New Zealand .	June 20, 1910 .	Nov. 19, 1912 .	2 years 5 months

time occupied been less than two years. This is a Dockyard-built ship, and plans are issued in such case at an early date so that more work in preparing material can be done before laying the keel. Even allowing for this the performance is very good, and reflects the advantage of the higher degree of discipline of the workers in its effect on regularity of attendance at the yard. But the time has come when serious consideration should be given to the question of laying down ships earlier in the financial year in order to allow more than two years for their completion.

Reference has been made to the unreliability of labour to achieve such end. An operative factor is also the increase in labour involved in later ships. The average of prices submitted by shipbuilding contractors for the building of the hull and the construction of the propelling machinery (excluding armour, guns, gun mountings, and torpedo fittings) of the vessels of the Queen Elizabeth class, of 600 ft. in length, 27,500 tons displacement, and 56,000 S.H.P. designed power, was £1,100,000; while the corresponding figure for the first contract-built Dreadnought of 1907 was £675,000, her length being 490 ft., her displacement tonnage 18,600 tons, and power of the main engines 23,000 S.H.P. Any layman can appreciate that more time is required to accomplish the work involved in the larger cost. Market conditions somewhat affect the result, but only in a moderate degree. Time required to build battleships.

The true basis of comparison is the number of man-hours required in the building of ships and machinery. In such comparison it is important to eliminate variants, since some firms do more than others, purchasing less of the accessories from outside firms. A firm which does the maximum amount of work—is less dependent on other firms for auxiliaries—offers the most suitable example of the labour value of a warship. In their case it is found that the battleship of fifteen years ago, having a length of 390 ft. and a displacement tonnage of 12,950 tons, involved in the construction of the ship only 5,273,368 man-hours. At 52 hours per week, and 50 weeks per annum, this meant for the hull alone the employment

for two years of over 2000 workmen. The first Dreadnoughts involved only a slight addition, although the length had been increased to 490 ft. and the displacement tonnage to nearly 19,000 tons. The actual number was 5,489,863 man-hours. But in the intervening eight years marked advance had been made in labour-economising machinery. The great advance in the size of present-day ships has added materially to the work involved. It is too soon to speak of the Queen Elizabeth class, but it can be said of the Iron Duke class, of 580 ft. length and 25,000 tons displacement, that the hull will require the work of 7,200,000 man-hours, or of about 2800 men for two years. The increase of man-hours is thus most marked: in six years it has been equal to about 32 per cent., despite the improvement in mechanical appliances in the factory. The price for hull and engines, as given above, advanced in the same period at a much greater ratio.

The question arises as to how many men may work on a ship without being in each other's way. Inquiry at a prominent firm elicited the view that fifteen years ago the greatest number employed on a battleship at any one time was 1210, five years ago 1290, and now about 2000, but, as already shown, to complete the ship of to-day in two years an average of 2800 men ought to be always at work.

Time required for battleship machinery.

In the case of the propelling machinery there has not been the same increase in labour, owing to the introduction of the turbine. The battleship of fifteen years ago had reciprocating engines of 13,500 H.P., that of to-day has turbines of more than double this power, yet the number of man-hours involved in the manufacture of the machinery has only increased from 1,789,000 to 1,850,000; in other words, the number of men required to work full time for two years has gone up only from 680 to 712. Some explanation of this is found in the fact that, whereas in the case of reciprocating engines only some 55 per cent. of the cost was for material, the remaining 45 per cent. being for labour, the material for turbines—much of it machined ready for fitting—absorbs 72 per cent. of the total cost, leaving only 28 per cent for labour. In the case of the hull there has not been the same advance in the cost for material, the proportion thus absorbed having increased from 46½ per cent. to 54 per cent., leaving for labour respectively 53½ and 46 per cent. of the total cost of hull.

Time required for making armour and gun mountings.

Labour is also required in the production of armour and other structural material, as well as in the manufacturing of gun mountings and torpedo fittings, the latter two items costing nearly one-fourth of the total expenditure involved in a modern ship. Here, also,

irregularity in attendance of workmen has involved delay. It is not fully realised that the time required to produce each armour plate, from the casting of the ingot to the completion of the plate ready for fitting on to the ship, is three months, irrespective almost of size, and very many plates, totalling over 6000 tons of armour, are required for present-day ships. The twin-gun mountings for five barbettes, with their complicated machinery, require twenty-one to twenty-four months from the placing of the order to completion ready to fit on board.

It should be remarked that the building of a battleship ready for service involves directly the employment of over 5000 men continuously for two years, and so it will be conceded that the task set warship builders of completing a ship within two years is a difficult one even under favourable conditions. If they add to their contract price a sum for overtime or to meet possible penalties for delay due to contingencies, they only act prudently. The cost of the ships is increased thereby without even the surety that the time of delivery will be kept. Would it not be better to lay down the ships earlier each year, and thus allow for possible delays? Happily there are indications that this course is finding support at the Admiralty.

Five of the eight capital ships provided for in the 1909–10 programme were completed and commissioned during the past year. **1909-10 programme.** It will be remembered that four of the ships were laid down in ordinary course, the battleship Orion on November 29, 1909, at Portsmouth, the battle cruiser Lion on the same day at Devonport, the battleship Colossus at Scotts' of Greenock on July 8, 1909, and the Hercules on July 30, 1909, at Palmer's at Jarrow. The Admiralty took power to make preparations if necessary "for the rapid construction of four further ships," and the battleships Monarch, Thunderer and Conqueror, and the battle-cruiser Princess Royal, were laid down in private works on the dates given in the table on page 5. The Orion, Colossus and Hercules were commissioned in 1911–12. The construction of the others was delayed by labour troubles, and in the case of the battle-cruisers Lion and Princess Royal, by the necessity of placing the forward funnel abaft the tripod mast, as the gun-control station on it was swept by the hot gases from the funnel during high-speed steaming. This necessitated the reconstruction also of the uptakes from the boilers in the forward stokehold. As stated in the House of Commons, defects, since rectified, in the gun mountings in the Conqueror further delayed that ship. All of the ships, which the Admiralty desired to be "rapidly constructed," should have been commissioned in April, 1912, but some of them

were six or seven months late. These ships were described in previous issues of the *Naval Annual*, the important feature being the adoption of 13·5-in. guns instead of 12-in. guns in the primary armament and the placing of all the twin-gun barbettes in the centre line of the ship.

The results of the steam trials of the three earlier vessels tried were given in last year's *Naval Annual.* The performances of the other ships, along with those of the battleship King George V. and the New Zealand, the latter built at the expense of the Dominion, and both belonging to the 1910–11 programme, were given in *Engineering* as follows:—

Type and Name.	Contractors.	Thirty Hours' Trial.		Full-Power Trial.	
		S.H.P.	Coal per S.H.P. per hour.	S.H.P.	Coal per S.H.P. per hour.
Battleships—					
Conqueror . . .	W. Beardmore & Co..	18,926	1·7 lb.	29,835	1·7 lb.
Thunderer . . .	Thames Ironworks .	19,370	1·9 „	27,604	1·7 „
King George V. . .	Portsmouth Dockyard and Parsons Co. .	19,808	1·9 „	28,005	1·7 „
Battle-cruisers—					
Lion	Devonport Dockyard and Vickers, Ltd. .	54,763	1·7 „	75,685	1·7 „
Princess Royal . .	Vickers, Ltd. . . .	53,315	1·6 „	76,510	1·7 „
New Zealand . .	Fairfield Co. . . .	31,794	1·6 „	46,894	1·3 „

Speed of battle-ships.

As to the speeds of the respective ships they do not differ materially for each class. The Conqueror may be taken as typical. On the thirty hours' trial at high power, which can be maintained as long as fuel lasts, six runs over the measured course at Polperro gave a mean speed of 19·36 knots, the turbines during these runs working at an average of 19,200 S.H.P. On the full-power trial a similar number of runs were made over the same course. The mean speed realised was 22·12 knots, with the turbines developing 33,200 S.H.P. A notable feature was the remarkable uniformity of power and speed on the runs, the former varying only between 32,890 and 33,380 S.H.P. and the latter between 22·062 and 22·133 knots. Three successive runs were at this latter speed.

Speed of battle-cruisers.

Much has been written regarding the speed of the battle-cruisers Lion and Princess Royal, and exaggerated reports have been given almost without exception. Something may no doubt be said in favour of secrecy in this respect; but there is disadvantage in the general acceptance of inaccurate reports, not only in this country, but abroad. It is very probable that foreign naval *attachés* have now succeeded in

learning the true speed; if not, the reports persistently repeated may induce foreign Powers to aim at rates which, even if possible, would involve very great expense. The power actually realised is given in the table, and it may be said that on six runs on the measured course at Polperro during the full-power trial, the mean speed was 28·5 knots, the rate on the runs varying, according to tidal current, between 27·96 and 29·35 knots. Neither engines nor boilers were pressed—that is prohibited now on all large ships' trials in the British service—and it is possible that the vessels may exceed this rate in service, but they cannot conceivably achieve the rates attributed to them in the daily press.

1910–11 programme.

Five armoured ships were ordered under the 1910–11 programme, and all of these have been launched—one, the King George V., has passed through her trials and was commissioned in one year and ten months from the laying of the keel. Details of the design of these vessels were given in the last issue of the *Naval Annual.* Moderate progress has been made with the other ships. The Centurion, which was built at Devonport, began her trials in November last, but was in collision during the night of December 9th with a merchant ship, which was sunk with all hands, and was subsequently discovered to have been the Italian steamer Derna. The battleship had to undergo repairs, and the trials were completed in March, and proved as satisfactory as those of the other ships. The Ajax, building at Scotts' at Greenock, went on trials also in April. The Audacious, building at Cammell Laird's of Birkenhead, will probably go on trials in June. As to the battle-cruiser Queen Mary, now being completed at Palmer's Works, Jarrow-on-Tyne, and being fitted with her propelling machinery by Messrs. John Brown & Co., Ltd., of Clydebank, the trials will also be early in the summer. This vessel belongs to the Lion class, and differs little from that vessel or the Princess Royal in general design. The length is the same, 660 ft., but the beam is 6 inches more, 89 ft.; while on the same draught of 28 ft. the displacement is 650 tons more, namely, 27,000 tons. The turbine machinery is designed to give about the same power, so that the speed will be practically the same—28½ knots. The armour and armament also is practically the same, and the disposition does not vary materially.

During 1910 also there were laid down two battle-cruisers to be built by arrangement, one with the Dominion of New Zealand, and the other with the Commonwealth of Australia. The New Zealand, which was built by the Fairfield Company, of Glasgow, has been completed, and the results so far as steaming performance is concerned are given in the table on the opposite page. The designed speed of

25 knots was considerably exceeded. On February 6th, His Majesty paid a compliment to the Dominion by visiting the ship at Portsmouth, preparatory to her departure, on the following day, on a world-encompassing cruise, during which she will visit not only New Zealand ports, but several of the Colonies, returning to Home waters to take up her place in the First Battle-Cruiser Squadron. This concession, made by the Government of New Zealand, has been very greatly appreciated, but it remains to be seen what course is to be pursued to carry out the original intention of a combination of units for the East for which New Zealand, Australia and India were to be more or less responsible. The Australia, which was constructed by Messrs. John Brown & Co., Ltd., of Clydebank, belongs also to the same year's programme. This vessel completed her speed trials in March, and the results were completely satisfactory. The speed was considerably over 25 knots.

1911-12 programme. It is well known that the labour troubles of last year considerably affected the progress made with the ships of the 1911–12 programme, particularly with those given out to contract. There were four battleships and one battle-cruiser. Of the former, the Iron Duke was laid down on January 15, 1912, at Portsmouth Dockyard, and was launched on October 12th. The Marlborough was laid down at Devonport Dockyard on January 25th, and was launched on October 24th. The turbine machinery of the first-named is being made by Messrs. Cammell Laird and Co., Birkenhead, and of the second-named by Messrs. Hawthorn, Leslie & Co., Newcastle-on-Tyne. The progress made with the ships and machinery, as well as with the gun mountings, indicates that the vessels will be completed within two years. The Delhi and the Benbow, ordered respectively from Messrs. Vickers, Ltd., Barrow-in-Furness, and Messrs. William Beardmore & Co., Dalmuir, are not so well advanced. The keel of the former was laid on May 31st, while the keel of the Benbow was laid on May 30th, and they will be launched in July or August.

The vessels of the Iron Duke class mark a step forward, as compared with the King George V. class. They are 25 ft. longer, being 580 ft. in length, while the beam has gone up from 89 ft. to 90 ft. The draught is 28 ft., at which the displacement is 25,000 tons. There has also been an increase in the extent of armour protection, the main belt being 12 in. on the water line, 9 in. on the strake above this, and 8 in. to the upper deck. The armament includes ten 13·5-in. guns, while twelve 6-in. guns are mounted within a citadel formed by the upper strake of the armour on the sides of the ship. In addition there are six 3-pdrs., and

the four tubes are designed, as in the immediately preceding ships, for 21-in. torpedoes. The turbine machinery and eighteen Yarrow boilers are designed to give 29,000 S.H.P., in order that the speed may correspond with that of the immediately preceding battleships.

The fifth armoured ship ordered is the battle-cruiser Tiger, and the building of it was entrusted to Messrs. John Brown & Co., Ltd., Clydebank, and the keel was laid on June 20th. Many statements have been made regarding the design; and while it is not desirable yet to enter into details, it may be said that generally the design corresponds to that of the battle-cruiser Queen Mary. The beam is greater, and so also is the draught, while the displacement has gone up about 1000 tons. This is largely to accommodate torpedo-repelling guns within an armoured citadel, as in the Iron Duke class. The power has been increased, but only in proportion to the displacement; the designed speed will not be much greater than in the preceding battle-cruisers.

The programme for the past year arranged for the building of four armoured ships. These are to be built, the Queen Elizabeth, at Portsmouth, with engines by the Wallsend Slipway and Engineering Company, Ltd., Newcastle-on-Tyne; the Warspite, at Devonport, with machinery by Messrs. Hawthorn, Leslie & Co., Ltd., Newcastle-on-Tyne; the Valiant, at the Fairfield Works, and the Barham, at Messrs. John Brown & Co.'s works at Clydebank, the machinery in the two latter cases being by the builders of the hull. The two dockyard ships were laid down: the Queen Elizabeth on October 21 and the Warspite on October 31, 1912, while the Valiant was begun on January 31 and the Barham on February 24, 1913. These ships are of an entirely new design, guns of greater calibre being fitted, with a reduction in number, while the armour is increased. The length of the hull has had to be augmented to 600 ft. and other dimensions in proportion, the displacement being 27,500 tons. The power of the propelling machinery has also been increased. Indeed, the vessels would seem to resemble more the battle-cruisers, the increased weight resulting in some loss in speed as compared with battle-cruisers. **1912–13 programme.**

This year's programme provides for the construction of five battleships. No details are yet available as to their design. One is to be built at Portsmouth Dockyard, and on it £215,346 is to be expended during the financial year, while for another, to be laid down at Devonport, the sum provided is £214,534. The three other ships are to be constructed by contract. The sum provided for each is only about £28,000, so that little work upon them is contemplated. **1913-14 programme.**

The Admiralty have decided that the term "cruiser" will in **Cruisers.**

future be used to designate all vessels at present classed as "armoured cruisers" and "protected cruisers, first class," in contradistinction to "battle-cruisers" and to "light cruisers," the latter including all other cruisers as well as the vessels hitherto classified as "scouts." This classification "cruiser," therefore, will include all the older armoured cruisers and first-class protected cruisers of the Diadem, Powerful, and Edgar types, but not the vessels of the "Town" class. Of these latter, fifteen have been built, excluding the Melbourne and Sydney, built in this country, and the Brisbane, being built in Australia, for the Navy of the Commonwealth. The Melbourne has been completed, and has gone to Australia; the Sydney will follow her this summer. There has been a steady development in the armament and protection of these "Town" cruisers. Five were built under the programme of 1908–9, four were laid down in 1909–10, three in 1910–11, and three in 1911–12; but since then no such vessels have been ordered. A brief table will indicate the development in the dimensions of these ships.

The "Town" class.

Class.	Length.	Displacement.	Armament.	Coal supply.	Designed power.	Designed speed.
	feet.	tons.		tons.	H.P.	knots.
Newcastle . . .	430	4,800	Two 6-in. B.L. Ten 4-in. B.L.	650	22,000	25
Falmouth . . .	430	5,250	Eight 6-in. B.L.	650	22,000	24·75
Dublin	430	5,400	Eight 6-in. B.L.	650	25,000	25·5
Lowestoft . . .	430	5,440	Nine 6-in. . .	650	25,000	25·5

It will be seen therefore that there has been a steady increase in the armament of the ships. The earlier cruisers were certainly too lightly armed, and there can be no doubt that the nine 6-in. guns in the latest ships are immensely superior to the two 6-in. guns and ten 4-in. guns of the first of the class. This, it is true, has involved an increase of 640 tons in displacement and of 3000 S.H.P. in the designed power of the machinery, in order to ensure the desired speed. At the same time, there has been a steady development in the armour protection. The first nine vessels of the class, laid down in 1908–10, had a nickel-steel lower deck, extending right fore and aft, of a thickness of 2 in., reduced forward to ¾ in. In the later vessels, as well as in the Australian cruisers, there are two thicknesses of protective side plating, right fore and aft, the outer of nickel steel and the inner of high tensile steel, extending from the upper deck to well below the water line; the total thickness is 3 in., reduced slightly at the forward and after ends.

The last of the vessels of the 1909–10 programme, the Yarmouth

was commissioned on April 18, 1912, the time which elapsed from the laying down of the keel to the completion of the vessel being nearly two years and three months owing to labour troubles. All three vessels of the 1910–11 programme were commissioned during the past year—the Southampton, built by Messrs. John Brown & Co., Ltd., on November 26th, the Chatham, constructed at Chatham Dockyard and supplied with machinery by the Thames Ironworks, on December 3rd, and the Dublin, built and engined by Messrs. William Beardmore & Co., on January 26th. The average time taken for the completion of these vessels from the laying down of the keel was nearly one year and ten months, the Southampton taking the shortest time, namely, one year and eight months. Along with these vessels, there was tried during the year the Melbourne, for the Australian Navy, built and engined by Messrs. Cammell Laird & Co., Ltd. The trial performances of all four ships were given in *Engineering* as follow:—

Name of vessel.	High-Power Trial.		Full-Power Trial.	
	S.H.P.	Coal per S.H.P. per hour.	S.H.P.	Coal or equivalent of coal per S.H.P. per hour.
		lb.		lb.
Dublin	22,606	1·8	26,041	1·8
Chatham	22,127	1·9	25,901	1·8
Melbourne	24,600	1·4	28,185	1·3
Southampton	23,607	2·1	26,493	1·6

As regards speed, it may be taken that all these ships are capable of steaming at 25¼ to 25½ knots.

All of the three vessels of this class provided for in the 1911–12 programme were to have been built by contract. There was great delay in arranging for their construction. The order for the Birmingham was not placed with Sir W. G. Armstrong, Whitworth & Co., Newcastle-on-Tyne, until after the close of the financial year, and the keel was laid on June 10, 1912. The Admiralty, with the desire of providing work for the artisans of the East End of London, were anxious to place the order for the two others, the Lowestoft and the Nottingham, with the Thames Ironworks, provided there was guarantee that the work could be carried out within the specified time. An effort was made to secure the co-operation of a northern firm of shipbuilders, but, owing to the labour conditions exacted by the trade unions and granted by the management of the Thames Ironworks, this arrangement fell through, with the result that the Admiralty had ultimately to lay down the ships in the Government

Dockyards at Chatham and Pembroke, nearly six months' delay being involved. The order for the machinery of the Lowestoft was placed with the Fairfield Co., and of the Nottingham with Messrs. Hawthorn, Leslie & Co. The keel of the Nottingham was laid on June 13th, and of the Lowestoft on July 29th. All three vessels have been launched.

Light cruisers.

The term "light cruiser" will apply to the eight vessels ordered late last year. The Arethusa was laid down at Chatham on October 24th, and the Aurora at Devonport on October 28th. Again, to assist artisans in the East of London, the Admiralty placed the order for the machinery of these two vessels with the Thames Ironworks, but, owing to financial difficulties, this decision had to be rescinded, and the machinery for the two ships was finally ordered respectively from the Fairfield Company and the Parsons Marine Steam Turbine Company. Three others are to be built and engined by Messrs. William Beardmore & Co., the Galatea, the Inconstant, and the Royalist; two by Messrs. Vickers, Ltd., the Penelope, and the Phaeton; and one by the Fairfield Company, the Undaunted. These vessels are of an entirely new class, their length being 410 ft. With turbine machinery of 30,000 H.P., the speed is expected to be 29 knots. They will be armed almost as heavily as the first "Town" class cruisers, and their protection will equal the later vessels of the same class. These particulars fully bear out the statement of the First Lord of the Admiralty, that, for their size, they will be the fastest, most powerfully armed, and best protected of any vessels yet designed.

Eight more light cruisers, probably of the Arethusa class, are to be laid down this year. Two are to be built at Pembroke Dockyard. One of these will be commenced immediately, and £178,048 is to be expended on her advancement before March next; but on the other only £77,586 will be spent. One is to be constructed at Chatham, and £50,424 is voted for progress during the year, so that work will not be commenced until late in the autumn. This applies also to the five vessels of the type to be built by contract, as the sum allotted for each varies between only £24,915 and £28,335.

Under the same definition of "light cruiser" there falls to be included the succession of unarmoured cruisers built at Pembroke, and regarding the utility of which some doubt has been expressed by many naval authorities because of the light armament. Whether or not these strictures were justified, it is significant, and perhaps satisfactory, to know that since the Fearless was laid down in 1911 no further vessels of the class have been ordered. The Fearless was launched on June 12th last, and will be tried and passed into commission this summer.

The eight "scouts" of the Attentive class, completed in 1905, are now undergoing an extensive refit in the dockyards and are to be re-armed. Their original armament consisted of ten 12-pdr. and eight 3-pdr. guns, which, as has repeatedly been pointed out in the *Naval Annual*, was quite inadequate. It is satisfactory therefore to learn that the Admiralty have decided to substitute nine 4-in. quick-firing guns, which will be a great improvement, especially in view of the speed—about 25 knots.

Torpedo-boat destroyers.

Four years ago the practice was introduced of designing the destroyers at the Admiralty, but in each year a number of special vessels were designed by their builders. Thus, in 1910, of the twenty-three vessels laid down nine were of special design, and in 1911, eight of the twenty; but last year practically all the vessels were of Admiralty design, although modifications have been made—some in respect of machinery. The uniformity of design has undoubtedly great advantages in ensuring greater homogeneity in a flotilla, but it would be idle to neglect the gain which accrues from competition in design. It is true the Admiralty have greater opportunities of studying the work of the vessels in commission, and in deducing lessons of great influence in improving efficiency, but such lessons can easily be embodied in the general conditions to be fulfilled in builders' designs, leaving them to utilise their experience in ship form, the position of the bilge keels, structural details generally, and in the design of machinery. This is the procedure adopted in Germany, where also the vessels carry as a prefix to their number the initial letter of the builders' names; thus, V for Vulcan, G for Krupp of Germania, and S for Schichau. The builders are thus by publicity credited with good performance and discredited with mishap. There is the further fact that such an arrangement enables the firms to design and lay down torpedo-boat destroyers in anticipation of orders, with the consequence that the German destroyer programme has been greatly accelerated more than once. There seems no reason why a similar procedure should not be introduced in connection with the building of British boats, only a nominal encouragement being necessary to induce the leading builders at once to take up work on lines acceptable to the Admiralty.

Fifteen destroyers were commissioned during the past year. All the destroyers of the 1910–11 programme are now in commission, and have greatly strengthened the flotillas associated with the First Fleet. The twenty destroyers of the 1911–12 programme were not ordered until late in 1911. Five of these have already been commissioned. By the time the *Naval Annual* is in the hands of readers all the vessels will have been floated. The names of the builders

of the twenty destroyers were given in last year's *Naval Annual*, along with the leading particulars.

Owing to the destroyer programme of Germany having been accelerated, the Admiralty placed orders for the twenty destroyers of the 1912–13 programme early in April with the following firms:—

Daring and Dragon	Thornycroft & Co.
Haughty, Havock, Hereward, Hotspur	Yarrow & Co., Ltd.
Florizel, Ivanhoe, Talisman, Waverley	Fairfield Co.
Orlando and Viola	Denny, of Dumbarton.
Portia and Picton	William Beardmore & Co., Ltd.
Redgauntlet and Rosalind	J. S. White & Co.
Rob Roy and Rocket	Palmer's Shipbuilding Co. and Parsons Marine Steam Turbine Co., Ltd.
Sarpedon and Ulysses	Swan, Hunter & Wigham Richardson, and Wallsend Slipway and Engineering Co.

These vessels are 260 ft. in length, with a beam of 27 ft., and in sea-going trim have a displacement of 945 tons. Like their predecessors, they are driven by twin-screws. The armament is to include three 4-in. guns, and there will be two tubes for discharging 21-in. torpedoes. The speed provided for in the trial is 31 knots; they are thus faster than their predecessors, and have an effective armament. We are still, however, a long way behind some other Powers, notably the Chilians, who have in course of construction by Messrs. White, of Cowes, six destroyers, which have a displacement of 1850 tons when fully loaded, their length being 320 ft. They also are designed to steam at 31 knots, the turbine machinery being of 30,000 H.P. Their armament includes six 4-in. guns, four Maxims, and three torpedo tubes.

During 1912 there passed through their steam trials thirteen vessels, of which six were specially designed, while the others were designed by Sir Philip Watts, the late Director of Naval Construction. These latter vessels were 240 ft. long, and 750 tons displacement, designed for speed of 27 knots, the armament being two 4-in. and two 12-pdr. quick-firing guns. In each case the designed speed of 27 knots was exceeded, the rates attained ranging from 27·2 knots to 28·7 knots. The feature of the special vessels has reference to machinery, a subject which is dealt with separately in a subsequent chapter.

Sixteen destroyers are provided for in the programme of the current year. All are to be built by contract, and work will be commenced on them at an early date, as £543,819 is provided in the 1913–14 Estimates.

Sub-marines.

The Admiralty policy in connection with the building of submarines is undergoing change in the direction of increasing the number of firms building this type of craft, principally with a view of

testing various types of boats. Moreover, it seems probable that there will be two distinct classes—one of vessels of considerable size and the other smaller vessels. The progress in design has been very satisfactory, and Messrs. Vickers, who have so far built all the submarines for the British Navy, are continuing their experimental work, an order for two vessels of special type having recently been placed with the firm; in this case the armament and speed is to be considerably increased. So far, the largest of our ships are those of the E class, with a length between perpendiculars of 176 ft., a beam 22 ft. 6 in., and a displacement submerged of 790 tons. The machinery is of 1600 H.P., to give a surface speed of 15 knots. Even with increased offensive power, this speed will be increased. The Germans have also ordered a vessel of considerably greater size, her length being 214 ft. and her beam 20 ft., while the displacement submerged is close upon 900 tons. In this case an effort is being made for higher speed rather than for heavier armament, 20 knots on the surface being aimed at. During the past year three submarines, including two of the E type, were passed into the Fleet, while five vessels of the E class and four of new types were ordered. Much interest is centred in the trials, which will take place in the summer, of the new type of submarine boat, built by Scotts' Shipbuilding and Engineering Co., Ltd., in view of the special features of the design, the most notable of which is perhaps the fact that the vessel is fitted with a double skin, so as to minimise the danger resulting from collision. Sir W. G. Armstrong, Whitworth & Co., Ltd., have also received orders for two submarine boats; these will be of the Laubœuf type.

There are in progress twenty-one submarines, including two for the Commonwealth of Australia, the two special vessels by Messrs. Vickers, the two by Sir W. G. Armstrong, Whitworth & Co., and the one by Messrs. Scott. In the current year (1913–14) one is to be laid down at Chatham. On new contract-built submarines £320,300 is to be spent, but the number to be laid down in private works is not stated in the Estimates.

Ordnance. As regards ordnance, satisfactory progress has been made during the year. The new designs of gun-mountings, of the hydraulic transferable type, have been fitted to several ships, and have proved efficient. The improved torpedoes have increased speed, range, and accuracy. The First Lord states that reserves of ammunition are "fully maintained in spite of the large additions to the Fleet," and that the results of the various gunnery practices, "taken as a whole, may be considered very satisfactory."

Air-craft. Progress in Naval Aeronautics is dealt with at length in a later

chapter. The Naval Wing of the Royal Flying Corps is associated with the Military Wing; the Central Flying School at Upavon, commanded by Captain Godfrey Paine, R.N., is common to both. Four Naval and Marine officers have also been appointed on the Staff, of whom two have been graded as Squadron Commanders. An Air Department has been established at the Admiralty, and Captain Murray F. Sueter, R.N., has been appointed Director.

The principle of close co-operation between the Navy and Army in this Department has been generally approved, because, as stated in the general Memorandum explanatory of the scheme, while the needs of the Navy and Army differ, each requiring technical development peculiar to sea and land warfare respectively, yet the foundation of the requirements of each Service is identical, especially in respect of the training of efficient airmen. The intention is that in the event of a purely naval war, the whole of the flying corps will be available for the Navy, while in a purely land war the whole corps will be at the service of the Army. The Royal Air-craft Factory and the Aeronautical Advisory Committee are common to both services. The Aeroplane Section of the Naval Wing has its flying school at Eastchurch. The progress made was demonstrated on two occasions in 1912, when exhibitions of the prowess of the naval airmen were given at Weymouth and Portsmouth, before the King and the Members of the Houses of Parliament respectively. There is great room for development in connection with the construction of airships in this country. Two airships of the Astra Torres and Parseval types have been purchased for instructional and experimental purposes.

Hydro-aero-planes.

In respect of aeroplanes and hydro-aeroplanes much experimental work has been undertaken by the Aeronautical Advisory Committee, who are indebted to the National Physical Laboratory for the carrying out of much experimental research. At the same time good work has been done at the Royal Air-craft Factory, where, in addition to the training of airmen, there is undertaken the education of mechanics for the corps, the construction of aeroplanes, repair work, and, generally, the testing of British and foreign engines and aeroplanes of the latest design. It is intended to provide seven aeroplane squadrons, requiring 182 officer flyers and 182 non-commissioned officer flyers, and one-fourth of these it is expected will be able to pass through the flying schools per quarter. By March, 1913, the number of aeroplanes owned by the Army and Navy combined exceeded eighty, and provision is made for an addition by the summer of about fifty. Good progress has also been made with hydro-aeroplanes, which strongly appeal to naval men as being specially suitable for sea service.

Aeroplane performances.

In connection with the work of design and construction very interesting competition trials took place on Salisbury Plain during the summer months, prizes totalling £11,000 being offered, £5000 of which was for aeroplanes manufactured in the United Kingdom, with the exception of engines, and £6000 for aeroplanes manufactured anywhere. The conditions indicated generally the official conception of the requirements of the aeroplane, and included the carrying of a live load of 350 lb. with fuel oil for four and a half hours, in addition, of course, to the equipment of instruments; the ability to fly for three hours with this load; to maintain an altitude of 4500 ft. for one hour; to attain a mean speed of not less than 55 miles per hour in a calm; to plane down to the ground, in a calm, from not more than 1000 ft., with engines stopped, during which time a horizontal distance of not less than 6000 ft. was to be traversed before touching; and, also in a calm, to rise without damage from long grass, clover, or harrowed land, in 1000 yards. Forty-two entries were received. At the completion of the competition, only twelve of the machines had carried out a sufficient number of tests to justify their inclusion in the report of the judges.

It is gratifying to record that the principal prizes, both in the competition open to the world and in the one confined to United Kingdom machines, were won by a British aeroplane, although the next six in order of merit were French. Only one or two of the general results need be given. It was found that the weight of the machines when empty varied from 857 lb. to 1948 lb., the latter being the winning machine, and when loaded from 1481 lb. to 2658 lb., the supporting area being respectively 275 sq. ft. and 500 sq. ft. The horse-power of the motors ranged from 70 to 120. With the latter, in the successful machine, the maximum speed attained was 72·4 miles per hour, the slowest speed possible being 48·5 miles. The gliding angle was 1 in 6, the distance taken to stop on grass was 56 ft., and the climbing rate was 285 ft. per minute. The consumption of petrol was 9 gallons per hour, while the lubricating oil consumption was 0·41 gallons per hour. Ten of the machines attained the required height of 4500 ft. with a large margin to spare, and in a few instances a height of 1000 ft. was accomplished under three minutes with a load of 750 lb. The majority of the aeroplanes had a supporting surface of less than 300 sq. ft., while one of the successful machines had less than 200 sq. ft. The weight carried per square foot of surface was from 7 lb. to 9 lb., which showed a great improvement on results of a few years ago. Flights have been made in a wind officially registered at from 30 to 44 miles an hour. As regards the

fuel consumption, it was shown that some of the machines could travel over 400 miles without refilling the tanks.

The need for enterprise.

These results prove the potentialities of the aeroplane, but the present need is for private enterprise in connection with the construction not only of the aeroplanes but of the engines. It will be well if the Royal Aircraft Factory stimulates in every conceivable way such private enterprise. In this way manufacturing resource will be developed, more private airmen with scientific and mechanical training enlisted in the industry, and greater improvements made in the details of the machines in order to render the stabilising mechanism as automatic as possible. No doubt men with experience will act in emergency sub-consciously. As it is, it must be admitted that, large as are the number of fatalities, the percentage to the number of flights is lessening. It is computed that in 1912 there were 135 fatalities, 55 more than in the previous year, and five times the total of 1910. Yet the number of flights per death increased from 500 in 1910 to 1500 in 1911, and to 5800 in 1912. There is also the computation that the miles flown per death have increased in the three years from 20,000 in 1910 to 92,000 in 1912. These figures, compiled in France, cannot, however, be regarded as anything but a general indication of the decreasing risk in flying.

Auxiliary ships.

There have been commissioned for the Navy also a number of special auxiliary ships for service; each of these vessels has notable features in design. Unfortunately, misfortune continues to beset the submarine boat, mostly from extraneous causes, and the year was not without most regrettable cases. On February 2nd, submarine A3 collided with the parent ship Halyard off the Isle of Wight and sank immediately, the four lieutenants and ten men on board her being drowned. The wreck was salved and taken to Portsmouth. Submarine boat B2 was run down by the Atlantic liner Amerika off Dover, on October 4th, only one officer of the total crew of fifteen being saved. Entire blame was recognised by the owners of the Amerika. The salvage of the submarine boat was ultimately abandoned.

Submarine boat salvage ship.

A specially designed vessel has now been completed for this purpose by Messrs. Vickers, Ltd. She has a length of 160 ft., a breadth moulded of 44 ft., and a depth moulded of 18 ft. Ten special trunks are fitted for the passage through the bottom of salvage wires, which have the requisite block and tackle and purchase gear, the latter arranged for on longitudinal girders on the upper deck. These lifting wires are carried to steam capstans, three of which are fitted at each end of the vessel on the upper deck. These purchases

may lift a submarine boat from very considerable depths, and support it under the bottom of the vessel, where a specially constructed recess is formed, into which the conning-tower of a submarine boat may be housed. The combined lifting power of the capstans is 450 tons. The vessel is also equipped with powerful centrifugal pumps. To ensure the buoyancy for the supporting of submarine boats, there are provided a series of tanks along each side of the salvage ship. These tanks will be used on normal occasions for conveying fresh water to ships in service, their total capacity being about 1000 tons. For the filling and emptying of the tanks powerful pumps are provided with 5-in. pipes to run ashore or on to the ships to be supplied with fresh water. Arrangements are also made for carrying divers' boats and other conveniences for the special duties for which the vessel has been designed.

Sub-marine depôt ships.

The Maidstone, built by Scotts' Shipbuilding and Engineering Company, Ltd., serves as a depôt ship for submarine boats. She has a length of 320 ft., a beam of 45 ft., and a displacement tonnage of 3600 tons. Reciprocating engines give her a speed of 14 knots, and she is fitted with special gear to assist submarine boats in service and in distress. The Maidstone can supply practically everything a fleet of submarines may want at sea. Powerful air compressors and electricity generators are fitted, along with gear for recharging air reservoirs and electric batteries in the submarine boats. There are large capacity stores for torpedoes, etc., and hoisting and transporting mechanism for dealing with these. Oil fuel tanks and piping serve to pass fuel to the submarine boats, while for emergencies there are diving appliances, and well-equipped workshops, foundry, and smithy. The vessel, too, has a wireless telegraph installation.

Of kindred type of ship are the Adamant and Alecto, completed by Messrs. Cammell Laird & Co., Ltd., Birkenhead. These vessels are smaller, being of 930 tons displacement. They have a very high freeboard forward, which is reduced considerably aft, so as to facilitate the movement of torpedoes out of the water. Further to conduce to this end sheerlegs are fitted over the stern. These are of five tons capacity, and are intended to lift torpedoes out of the water, and other weights out of the submarine boats in connection with their repair at sea. In addition to extensive accommodation for storing torpedoes and for supplies for submarines, there are well-equipped workshops. The surveying vessel Endeavour, of 1280 tons displacement and 12 knots speed, was also commissioned during the year. She was built by the Fairfield Company. The hospital ship which was provided for in the past year's Estimates has not been proceeded with, neither have the two gunboats Kingfisher

Surveying ship.

and Rail, the orders for which were placed with Messrs. Yarrow & Co., but inspection of existing gunboats by the same firm has shown them to be still in serviceable condition. These two new gunboats are again included in this year's list of ships to be laid down.

A depôt ship for torpedo-boat destroyers, a repair ship, and a hospital ship (the Mediator) were purchased during the past year, and are being fitted out for their special services, while a new torpedo-boat destroyer depôt ship (the Woolwich) of 3880 tons is being completed at the London and Glasgow Shipbuilding Company's works in Glasgow. Several oil tank ships for conveying oil fuel to the fleet are being built; these are being fitted with Diesel oil propelling engines, and are referred to in a later chapter on the machinery of warships. Two tug-boats have been purchased and three are to be laid down this year.

Floating docks.

Three docks were delivered during the year, two of 35,000 tons capacity; one, built by Messrs. Cammell Laird & Co., Ltd., has been moored at Portsmouth Dockyard, and the other, constructed by Messrs. Swan, Hunter and Wigham Richardson, Ltd., in the Medway. Both have been tested, the former by the Neptune being docked in her, while the Medway Dock took the battle-cruiser Lion when drawing 31 ft. 6 in. of water, and displacing 30,415 tons. The third dock has a lifting capacity of 1500 tons, and is intended for submarine and torpedo-boat craft. Three other small docks are approaching completion—one, for destroyers, is for Harwich, and one, for submarines, is to be stationed at Dover, and the third, for destroyers, is for Portland. Another new floating dock is provided for in the programme of 1913–14.

Graving docks.

As regards graving docks work has proceeded satisfactorily at Portsmouth in connection with the reconstruction of the basin adjoining Whale Island, and the formation of two entrance locks, which will also serve as graving docks. One was completed in March, and the other will be available in the summer-time for the accommodation of the largest of existing ships. The length is 1000 ft., and the width at entrance over 100 ft. Among the other works at this basin is the addition of a 240-ton crane, built on the hammerhead principle by Sir William Arrol & Co., Ltd., of Glasgow. This crane has been tested, and will be very serviceable in connection with the fitting on board of the machinery and gun-mountings of the battleships constructed at Portsmouth; the lighter weights, armour plates, etc., are dealt with by travelling cranes running on the fitting-out wharves, and of a similar design to lift five to ten tons. By these and many other improvements at the Portsmouth Dockyard

even greater rapidity of work will be accomplished in connection with new construction and repairs.

Work at Rosyth.

The important work undertaken by the Admiralty at Rosyth has been somewhat checked by inclement weather and labour difficulties, but good progress is being made. The submarine and torpedo-boat destroyer basin is ready, and the construction of the battleship basin is progressing favourably. The work on the entrance lock is being tackled, but until it is completed the basin itself, the walls of which are almost completed, will not be available. The two graving docks, each of 1000 ft. in length, have their entrance from this basin. They are far advanced, and the construction of a third dock has been ordered. There is every prospect of the contractors anticipating the date prescribed for the completion of the work.

Bases in Scotland.

At many points along the Scotch coast important works are in progress. There are indications of possible developments in the Cromarty Firth, which is frequently visited by the Fleet. Already the building of oil fuel tanks is in progress, and a floating dock will be berthed here, as well as some form of floating factory for undertaking considerable repairs. The heads at the entrances are to be fortified and manned by marines, the garrison living on board the old battleship Renown, which has been selected for conversion to a receiving ship for this purpose. At Scapa Flow a number of Admiralty officials have been making general surveys for fuel stores, and a deep-water wharf will be commenced shortly. The development of the Dundee Naval base has proceeded apace. The Admiralty gained the sanction of the Harbour Trustees some time ago for the extension of their shore accommodation at the dock, and there is talk of a torpedo-destroyer base being added to the submarine base already existing. At Lamlash, on the Firth of Clyde, there is to be a base for light craft, but so far no constructional work has been begun. The torpedo range, 7000 yards long, at Loch Long, in connection with the torpedo factory at Greenock, has been completed. Many torpedoes have been tested after completion at the factory of Greenock, where over 1600 men are now engaged.

Oil fuel depôts.

Oil fuel depôts are under construction in the Humber—where there is to be a base for torpedo craft—in the Medway, and at Portsmouth, as well as at Invergordon. Good progress is being made with the inner harbour and depôt for destroyers and submarines at Dover, where a floating dock is to be stationed. Four battleships and three cruisers of the Third Fleet are to be based at Pembroke. Queenstown is to be a base for boys' training cruisers, and eight ships will be detailed for this service. Oil depôts are being made at Hong Kong, Gibraltar, and other foreign stations.

Dominion Navies: Australia.

The battle-cruiser Australia has now been completed. She completed her trials in March, and should be ready to leave for Australia in the course of the summer. The Melbourne left for Australia on January 29th; the Sydney completed her trials in April. The third cruiser of the class, the Brisbane, is being built at the Australian Government Dockyard at Cockatoo Island, Sydney, where also three destroyers, the Torrens, Swan, and Derwent, are in progress. These four vessels were laid down on February 1, 1913. Their turbine machinery will be constructed in this country. These various ships, with the torpedo-boat destroyers built two or three years ago, and the two submarines built by Vickers, Ltd., will constitute the fleet of the Commonwealth. As regards the *personnel* of this fleet, plans have been adopted for a naval college at Gervaise Bay, and recruiting has been proceeding, so that before the year is out the Australians will be possessed of the first part of that large scheme proposed by Admiral Sir Reginald Henderson, and dealt with in the last issue of the *Naval Annual*. H.M.S. Encounter, with a nucleus crew, has been lent for training recruits, a number of active service petty officers and men have been lent for the naval college, and H.M.S. Pioneer has been presented to the Commonwealth as a gunnery training ship.

New Zealand.

Reference has already been made to the New Zealand, the battle-cruiser which has been presented by the Dominion. The Hon. James Allen, the Minister of Defence, has been in this country conferring with the Admiralty upon the subject of New Zealand's contribution to the Navy.

Canada.

The situation as regards Canada has exercised very considerable interest throughout the year. The original idea of the Dominion was to construct a Canadian Navy, a proposal first made at the Naval and Military Conference in London in 1909. This fleet was to consist of five second-class cruisers and six destroyers, and to be manned by Canadians. At the Imperial Conference in London in 1911 the policy of a local Canadian Fleet was again before the Admiralty and was again accepted. In that year Mr. Borden became Prime Minister, and, accompanied by three of his Ministers visited Britain in the summer of 1912, and had many conferences with the Admiralty and the Committee of Defence. A statement of the relative position of the principal European Powers was prepared by the Admiralty, showing that, as a result of the change in the German Naval Law, the conditions relative to sea power were altered. This Memorandum, which is dealt with in another part of the *Naval Annual*, was accepted by the Borden Government as an indication that a grave emergency had arisen, since in the spring of

1915 Great Britain would have twenty-five Dreadnought battleships and two Lord Nelsons against seventeen by Germany, while the number of battle-cruisers (six) would be the same for each Power. Moreover, it was established that the reserve of strength due to the pre-Dreadnought ships is steadily diminishing since the new construction in Germany had been increased and accelerated. Mr. Borden's Government therefore decided that the Dominion should vote seven millions sterling for the construction of three of the largest and strongest ships of war which science could build or money supply. Mr. Borden's scheme provides that: "If at any time in the future it be the will of the Canadian people to establish a Canadian unit of the British Navy, these vessels can be called by the Canadian Government to form part of the Navy, in which case, of course, they will be maintained by Canada and not by Great Britain." Sir Wilfrid Laurier, who was responsible for the first proposal for a Canadian Navy, continues to urge the fulfilment of that scheme, but has expressed his readiness to support the Imperial Navy provided the emergency arises. Any reluctance that may exist in Canada is thus attributable, not to any lack of desire to support British sea supremacy, but to a difference of opinion as to the extent of the present menace or the degree of emergency in which we are placed. At the time of writing the scheme was still under consideration by the Canadian Parliament. Mr. Borden's scheme carries with it some form of representation of the Dominion on the Committee of Defence—a proposal which may have far-reaching effects.

South Africa.

In respect to South Africa, no definite step has been taken during the past year affecting relationship with the Navy. The *Times* of November 18th published a communication from their correspondent at Cape Town to the effect that the Union Government contemplate the construction and maintenance of a fleet unit, probably consisting of six small cruisers, to be manned and controlled by the Admiralty, but based upon South African ports. There has, however, been a political crisis, and no definite action has been taken. A South African Division of the Royal Naval Volunteer Reserve has been organised by the Government of the Union, and will be constituted on July 1st next.

The Malay States.

The Federated Council of the Malay States, on November 12th, passed by acclamation a resolution, moved by the Sultan of Perak, in favour of offering a first-class armoured ship to the British Government, costing not less than 2¼ millions sterling, payable within five years. This gift from native states, offered with remarkable unanimity, is one of the most gratifying incidents of the year,

and so expeditiously have the negotiations been carried out that the vessel has since been ordered from Sir W. G. Armstrong, Whitworth & Co., Ltd. She will be of the Queen Elizabeth type, and it is not inappropriate that this new departure in the relationship of the Mother Country with the Crown Colonies should coincide with the inauguration of the new shipbuilding works of this, one of the most prominent naval construction firms in the world. The Malayan ship is to be laid down in the new yard at High Walker, of 70 acres in extent, a river frontage of a mile, and situated five miles nearer the sea than Elswick. Entirely new shops have been erected and eight berths constructed to undertake vessels from 500 ft. up to 1000 ft. in length and of any beam. This change has been made by the Elswick firm because a limit was imposed on the breadth of ships which could be built at Elswick, owing to the width between the piers carrying the swing-bridge across the Tyne a little below the Elswick shipyard.

India.

Rumour has been persistent regarding the attitude of India towards the Navy. Some exaggerated statements were published during the year, but nothing definite has been done. This is the more surprising when it is remembered that, although the seaborne commerce of India totals 115 millions sterling, the annual contribution to the Navy is only £100,000, out of a total revenue of 82 millions sterling. It is true that very heavy expenditure is involved in the military forces of India, but the commerce, coast protection, and transporting of troops is dependent upon Britain's sea power. There is a prospect that India will voluntarily follow the example of the self-governing Dominions.

Increase in the Royal Corps of Naval Constructors.

Owing, it is understood, to certain recommendations made by Lord Inchcape's Committee, modifications in the *personnel* of the Royal Corps of Naval Constructors and their rates of pay have recently come into effect. As a result of the investigations of Lord Inchcape's Committee, an addition has been made to the Corps of four chief constructors and of a number of assistant constructors, and the latter grade is divided into first-class and second-class assistants. The Corps includes the Director of Naval Construction, the Director of Dockyards, three Assistant Directors of Naval Construction, the Superintendent of Contract Works, and the Superintendent of the Dockyard Branch at the Admiralty. There are now to be four Chief Constructors at the Admiralty, in addition to the eight officers of this rank employed at the Dockyards as managers, etc. The salary of the Chief Constructors is to begin at £700, rising to £850, with a house allowance of £75. It is also provided that five of the Senior Constructors in the Dockyards will, in the future, have

a special allowance of £75 in addition to their salary, which begins at £450 and rises to £600. This is an acknowledgment of the important character of the work undertaken in connection with new construction and the repair and refitting of ships. In the department of the Director of Naval Construction there are thirteen constructors as before, and in the Dockyard Branch twelve constructors. Their salary at the commencement is to be increased £50, becoming £450, and rising by annual increments to £600. The assistant constructors of the first-class are also to have an increase of £50 on appointment to this rank, their salary being from £250 to £450. On the other hand, assistant constructors of the second-class are to begin at £150, instead of £200 as at present, and to rise by annual increments to £180. It can scarcely be accepted that a young man, who has gone through a long course of training, either in private colleges and works or at Greenwich College and a dockyard, is adequately remunerated when asked to begin at a salary of £150, especially when advance is so slow as is almost inevitable in the Royal Corps, even under the new conditions. There had been an increasing tendency to advance foremen in the Dockyard to the rank of assistant constructor, but by the recommendation of the Committee this practice is, it is understood, to be discontinued. There will be a still greater desire on the part of assistant constructors to seek appointments as overseers, as their remuneration ranges from £250 to £450, with an allowance of £100.

Rates of pay in the Fleet.

From December 1st a new scale of rates of pay in the Royal Navy and Royal Marines came into force, the rates of nearly all classes up to and including Captains being improved, although not to the extent which had been anticipated. The details are given in the White Paper Cd. 6118, and involved an annual addition to the Estimates of £386,473. Much satisfaction was afforded by the new regulations regarding punishment, discipline, and investigation of charges against chief petty officers and petty officers brought into force during the year.

The Estimates for 1913–14.

The total sum included for all purposes in the Estimates for 1913–14 is £46,309,300, which compares with £45,075,400 in 1912–13 including the Supplementary Estimates. There is a decrease of £843,727 in the vote for progress with new construction work already authorised, the total being £11,224,000, against £12,067,727. The First Lord in his Memorandum stated that the extraordinary pressure of work in the shipyards and the scarcity of labour led to short earnings by contractors on the continuation programmes, and he did not estimate that more than £11,224,000 would be spent in 1913–14; but "every effort will be made to secure punctual deliveries, and

should conditions change and progress improve, a further estimate will be presented later in the year." The new ships to be built include five battleships, two of which will be laid down in the summer time at the Dockyards and the others later in the financial year in private works; eight light cruisers, one of which will be laid down soon, and the others later; sixteen destroyers to be laid down soon, together with a number of submarines and subsidiary craft. The total cost of the new programme is £15,958,525, as compared with £13,014,000 for the new ships of 1912–13. On the new ships £2,052,400 is to be spent during the year. The total of Vote VIII. for new construction is thus £13,276,400, against £14,595,527.

Personnel. The *personnel* is to be increased to 146,000 officers and men—an addition of 850 officers and an increase in average bearing throughout the year of 5000. There is a great shortage of officers, to which reference is made later. The increase in *personnel*, with advances in wages granted, involves the considerable addition of £712,200 to Vote I. for wages, while victualling and other votes incidental to *personnel* are all correspondingly higher. Among changes reported in the First Lord's statement are the following: The relative rank of officers of the Royal Marines when embarked has been revised. Lieutenants, Royal Marines, of two years' seniority, when afloat, now rank with Lieutenants, Royal Navy, while Majors, Royal Marines, rank with Commanders, Royal Navy. The limits in the age for the direct entry of Royal Marine officers have been altered from seventeen to eighteen to from seventeen to eighteen and a half, and higher mathematics has been made an optional instead of a compulsory subject. The Naval Medical School at the Royal Naval College has been established. Two courses for newly entered surgeons were held at the school last year, and the first post-graduate course commenced in September. A further post-graduate course began last month. Satisfactory arrangements have been made with the Dreadnought Seamen's Hospital Society and the London School of Tropical Medicine for the educational and scientific work of the medical officers of the Naval Medical School. With a view to the prevention and early detection of cases of tuberculosis in H.M. Navy, directions have been issued to the Fleet for certain hygienic precautions to be observed on board ship. A Committee has also been appointed to consider the best methods of ventilating modern ships of war. The Royal Marines borne on March 31st number about 16,300, with about 1400 band ranks. Of the number 4483 have re-engaged to complete time for pension, sixty-five more than in the previous year. An instructional turret has been completed at Eastney to afford training for gunlayers

prior to the course in the Excellent. Thirteen officers were admitted during the year by direct entry, and two commissions are to be granted each year to candidates selected from the non-commissioned ranks, etc. The authorised establishment of Coast-guard officers and men is 3130, and the numbers borne is 3037. The Royal Fleet Reserve has increased numerically from 24,082 to 25,788. In addition to the former classes A and B, an intermediate class has been established for seamen, stokers and Marines under thirty-two years of age, who left the Service before completing time for naval pension. They are enrolled in the Reserve for five years, serve annually twenty-eight days' training, undertake to join the Service in emergency, and draw a retainer of 1*s.* per day. They may, after the five years, join class B. The Royal Naval Reserve totals 18,191 officers and men, and 153 took short and special courses in instruction, 1055 a three months' course, 6101 the twenty-eight days' course, and 241 the eight or four days' course. In the Royal Naval Volunteer Reserve there are six divisions, comprising forty-four companies with 4223 on the strength on January 1st, while the establishment is 4597. The shortage is entirely in Petty Officers and men.

The new system of entry for officers.

Officers who have been trained under the common entry system are now serving afloat for about two years, and one-third of their time on board is being spent in the engine-room. Not until next autumn will they be required to make their choice as to the branch of the Service in which they intend to specialise—engineering, gunnery, torpedoes, or navigation. Twenty-five lieutenants in the engineering branch will be required at that date, and in view of the present indications, it is probable that volunteers to this number will come forward. No difficulty is anticipated in connection with the other special branches of the Service. All specialist officers will then be required to spend six months at Greenwich College in a sort of revision course. Lieutenants (E) will pass to the Keyham Naval Engineering College, which is to be re-opened in April, 1914, to take up a specialist course in engineering; gunnery and torpedo officers will proceed to Portsmouth for corresponding special courses. An interesting development, which will conduce to voluntary choice of the engineering branch of the Service, is the decision that in the selection of officers to command submarines, etc., preference will be given to Lieutenants who have specialised in engineering.

The deficiency in officers in the Fleet.

There is considerable anxiety regarding the future because of the insufficiency of watch-keeping Lieutenants at the present time, and this will be intensified with the large number of new ships

coming forward for commission. The need for officers must be recognised at least seven years before they are required to qualify for commissions, and it is urged that it could not have been foreseen in 1905 that Germany would have so increased her shipbuilding programme and the number of ships in continuous commission to such an extent as to require large additions to our Fleet with more than the normal increment of officers. Moreover, as the cost to the parent of a naval cadet varies at the lowest estimate from £100 to £120 per annum for seven years, there are fewer applications from among the sons of people of moderate means, such as retired officers and professional men, especially in view of the more lucrative openings in industry and commerce. To remedy the evil, certain "emergency measures, designed to prevent an anticipated shortage," are being adopted, but it is the intention of the Board to retain the Osborne-Dartmouth training for the main body of naval officers.

In the first place, a limited number of lieutenants and sub-lieutenants are to be entered on a supplementary list. Candidates are to be selected from officers of the Royal Naval Reserve who have served twelve months' training in the Royal Navy. In exceptional cases these officers may be eligible for promotion to the rank of commander. In the second place, a limited number of cadets of about eighteen years of age will be entered from the public schools or elsewhere by competitive examination during the next four years. They will then be sent to a naval establishment for a course of training before becoming midshipmen, but, owing to their greater maturity, the term in this rank will be shorter than in the case of midshipmen entering by Osborne and Dartmouth. From this point onward their career will be the same as that of other officers. They will be employed as general service officers, and may volunteer for service in any special branch. With the view to encourage the study of foreign languages and naval history, prizes, medals, and certificates in these subjects are to be awarded to junior Lieutenants. This may be a departure from tradition, but the principle underlying it—the stimulation of youth—is highly commendable, since the effective utilisation of the great expensive material of the Navy, and therefore success in war operations, is dependent upon the efficiency of the *personnel*.

ALEX. RICHARDSON.

CHAPTER II.

Foreign Navies.

France.

M. Delcassé, who was Minister of Marine in the cabinets of M. Caillaux and M. Poincaré, resigned his office with the change of government, and is now French Ambassador at St. Petersburg. During his term of office he carried forward the vigorous plans of naval regeneration which had been inaugurated, chiefly under his predecessor, Admiral Boué de Lapeyrère, and he obtained from the Chambers legislative sanction for the *projet de loi* and programme, covering several years, which had been introduced by that Minister, and had so far received effect by yearly votes. The dominant feature of M. Delcassé's policy was to maintain a Fleet capable of holding command of the Mediterranean against the combined forces of Italy and Austria-Hungary, and he completed the concentration in that sea by despatching thither the Third Squadron. His successor, M. Pierre Baudin, was Minister of Public Works in the Waldeck-Rousseau cabinet.

The year 1912 was one of great activity, and saw the Fleet emerge from the cloud cast over it by the Liberté catastrophe. A reorganisation and redistribution of the naval forces has taken place, the squadrons have been more actively employed, new construction has advanced more rapidly, an aviation service has been created, and a serious and sustained effort has been made, and is continuing, to arrive at a solution of the serious problem of the naval powders.

M. Painlevé, who was reporter on the Estimates of 1912, undertook the same duties in relation to those of the present year, and his report was a document of considerable interest. He emphasized the point that the building of ships, and even the provision of a contented body of officers and men, is not everything in the duties of naval organization. The Fleet must be provided with bases, stores, and means of repair, and he insisted that every naval programme shall be accompanied by an estimate of the cost in succeeding years of the docks, guns, stores, etc., which that programme will entail.

M. Painlevé is a firm supporter of French naval concentration in the Mediterranean, and his statement on the subject in dealing with

Concentration in the Mediterranean. Views of authorities.

the previous Estimates will be found in the *Naval Annual*, 1912, p. 37. In his latest reports he contends that the idea of commanding all the seas at once is but a chimera. Britain herself, he says, notwithstanding her power, is compelled to concentrate her forces in order to hold supremacy in the limited region of the North Sea, and most nations, he adds, have some particular maritime region which it is an imperious necessity for them to hold. "C'est pour la France le cas de la Méditerranée occidentale." Nature forbids an offensive embracing simultaneously both the Mediterranean and the ocean or Channel, and France cannot pretend to take the offensive in the north against one or other of the great Powers. "Ainsi donc: offensive en Méditerranée, défensive active dans la Manche et l'Océan, tel est le double objectif que l'organisation de nos forces navales doit nous permettre de réaliser."

M. Painlevé.

Même dans un duel avec l'Allemagne, c'est dans la Méditerranée que nos escadres devraient se trouver concentrées, au moins dans le premier temps des hostilités, pour maintenir nos communications entre la France et l'Afrique du Nord et protéger les échanges de troupes entre l'Algérie et la Métropole. La crainte du débarquement d'une armée allemande sur les côtes de la Manche ou de l'Océan est d'ailleurs illusoire. Nos flottilles et nos moyens rapides d'information et de mobilisation assureraient l'avortement d'une telle entreprise. Et, si la flotte allemande s'aventurait à chercher la bataille dans la Méditerranée, c'est là que nous aurions le plus de chances de la vaincre, car elle n'y arriverait qu'après le passage de deux détroits où les attaques de nos flottilles lui auraient vraisemblablement fait perdre l'avantage numérique qu'elle posséderait. Il n'est qu'un cas où la concentration systématique dans le Nord serait indiquée: ce serait celui d'une alliance franco-allemande contre l'Angleterre; nous ne pensons pas que cette hypothèse entre actuellement dans les prévisions vraisemblables.

Capt. Daveluy.

A considerable controversy has arisen concerning this vitally important question, and there seems to be a possibility that the new distribution may not prove to be final. Captain Daveluy, the well known writer on naval strategy, author of "La Lutte pour l'Empire de la Mer," 1906, and "L'Esprit de la Guerre Navale," 1909–10, has supported the concentration very strongly. He does not question that the coast towns on the Channel and the ocean might be subject to bombardment, which, however, he thinks could inflict but little serious damage; and he does not believe an enemy would commit the folly of landing troops, which could do no harm and which would be valueless for his own objects.

L'armée navale qui opérerait dans le Nord aurait à lutter contre des forces immensément supérieures; elle serait donc fatalement anéantie si elle prétendait disputer le terrain. . . . La seconde armée navale, celle qui opérera dans le Midi, sera dans des conditions un peu meilleures; elle aura sur ses adversaires une légère supériorité; mais celle-ci ne sera pas telle qu'elle puisse se flatter de conquérir l'empire de la mer sans consentir à de gros sacrifices. La division de nos forces aboutirait ainsi à un désastre certain dans le Nord sans qu'on soit assuré d'une victoire complète dans le Midi.

Captain Daveluy, however, pointed out that if France had in the North Sea a powerful ally, and if that ally, "faithful to the sound

traditions which have made her greatness," should, at the opening of hostilities, carry the war into the territorial waters of the enemy, "then the freedom of the ocean and the Channel would be assured, without the protection of our coasts being entrusted to a foreign Power, owing to the fact that the war would be conducted according to true principles." M. J. L. de Lanessan, formerly Minister of Marine, disputes these opinions, though he is in sympathy with their objects. It is his view that neither Great Britain nor France can think of fighting the combined fleets of the Triple Alliance alone—"et c'est de cette double vérité qu'est née l'Entente cordiale." **M. de Lanessan.**

La flotte anglaise ne pouvant pas plus que la nôtre tenir tête seule aux trois flottes de la Triplice, et l'Angleterre ne pouvant ni renoncer à sa situation navale méditerranéenne, ni se charger de notre défense dans le Nord, le bon sens le plus élémentaire veut que ses flottes et les nôtres se prêtent un appui mutuel à la fois dans le Nord et dans le Midi.

Rear-Admiral Darrieus, formerly professor of strategy and tactics at the Naval War School, and author of a remarkable volume entitled "La Guerre sur Mer: Stratégie et Tactique; La Doctrine," who held a command in the Mediterranean, has also opposed concentration in these waters, and it is worthy of note that he has since been called to Paris to act as Chief of the Cabinet to the new Minister. He does not agree that bombardment and invasion, made possible by the absence of the Fleet, are operations to be regarded lightly, **Rear-Admiral Darrieus.**

Dans l'état actuel des choses (he says) il n'est pas exagéré d'affirmer qu'une émotion intense serait la conséquence immédiate, dans le pays, d'une promenade sans entraves des escadres allemandes tout le long de nos côtes. . . . Les nouvelles, déformées et grossies par la distance, d'insultes commises impunément sur une parcelle du domaine national, sans qu'une répression immédiate ait pu les venger, affaiblirait fatalement le moral des troupes. . . . En quoi serait-il plus difficile à une flotte allemande, maîtresse de la mer, de jeter sur telles ou telles plages de nos côtes de Normandie, de Bretagne ou d'ailleurs, des armées importantes, qu'il ne l'a été à la marine japonaise de débarquer des hommes par centaines de mille à Chémulpo et sur le littoral mandchourien? . . . Je ne vois pas en quoi une pareille éventualité mérite l'épithète de chimérique. . . . La pleine liberté d'action de nos armées sur les Vosges, l'atmosphère de sécurité, condition essentielle de leurs opérations prévues aux frontières terrestres, exigent, en définitive, que nos *frontières bleues* soient gardées.

M. Painlevé insists in his report that there must be three battle squadrons each brought up progressively to a strength of eight battleships, each of them commanded by a vice-admiral, and the three with the cruiser squadron constituting a single fleet, commanded by a senior vice-admiral, flying his flag in a battleship not belonging to any of the squadrons. In view of this necessity, and the growing strength of the Mediterranean Powers, he thinks France will soon have to decide upon an increase of the present programme (twenty-eight battleships in 1920); and he advocates the addition of six battle-cruisers, whose construction is absolutely necessary.

SHIPS OF THE 1912 AND 1913 PROGRAMMES.

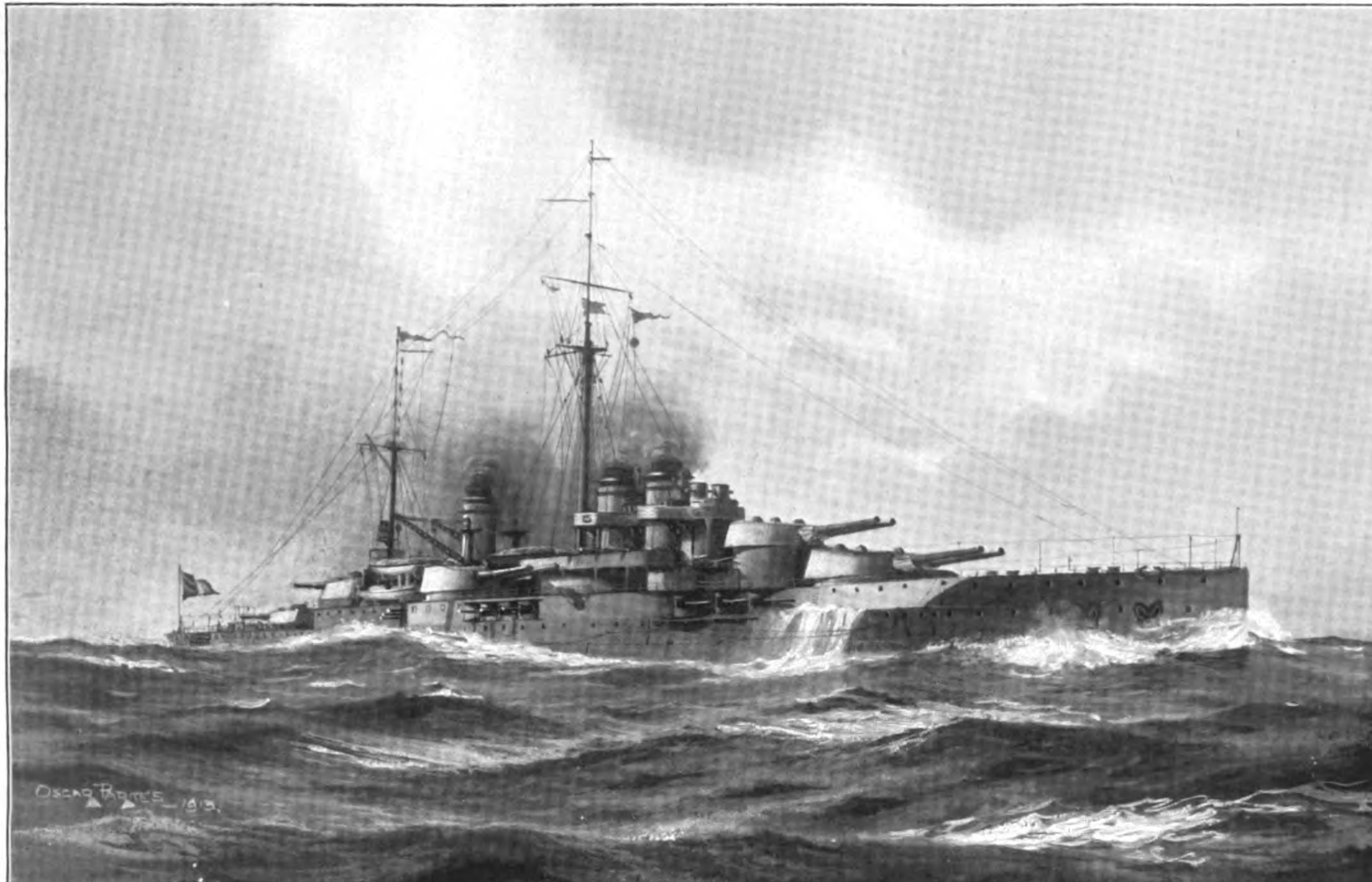
—	—	Displacement.	Laid Down.	Completion.
Bretagne . .	Brest . . .	23,600	May, 1912 . .	Summer, 1915.
Provence . .	Lorient. . .	23,600	May, 1912 . .	Summer, 1915.
Lorraine . .	St. Nazaire .	23,600	August, 1912 .	Summer, 1915.
Languedoc . .	La Seyne . .	24,800	May, 1913 . .	Spring, 1916.
Normandie . .	St. Nazaire .	24,800	May, 1913 . .	Spring, 1916.
Flandre . . .	Brest . . .	24,800	October, 1913 .	Autumn, 1916.
Gascogne . .	Lorient. . .	24,800	October, 1913 .	Autumn, 1916.

Battle-ships.

The *Naval Annual* described in 1911 the type of the first French "Dreadnoughts"—Jean Bart, Courbet, Paris, and France. The Paris was launched at La Seyne September 28th, and the France at St. Nazaire November 7th, and they are to be completed in the summer of 1914. In last year's *Naval Annual*, page 40, the new class (Bretagne, Provence and Lorraine) was described, these vessels resembling the Orion in the disposition of their main armament. The Lorraine is the vessel which is being built to replace the Liberté. As will be seen by the table, four ships are to be laid down this year, this marking an acceleration of the programme. Etat A of the Law voted by the Senate, March 29, 1912, shows that two battleships should be laid down in 1913, two in 1914, four in 1915, and two in 1917. It was decided, however, that all preparations should be made to begin two ships in the dockyards on January 1, 1914, but steps have since been taken to anticipate the work and to put the vessels in hand three months earlier. It was explained that this arrangement was made possible by the improved plant and greater working power of the dockyards at Brest and Lorient, where battleships can now be laid down at intervals of seventeen months instead of twenty months, as was recently the case.

Normandie class.

The four ships of 1913 differ completely in plan from their predecessors. Displacement, 24,800 tons; length, 574 ft. 3 in.; beam, 88 ft. 6 in.; draught, 28 ft. 4 in. The armament will consist of twelve 13·42 45-calibre guns, in three quadruple-turrets on the middle line, twenty-four 5·5-in. guns, in redoubts, and four 3-pdr. and there will be six submerged torpedo tubes. The maximum thickness of armour at the water-line will be 12½ in., reducing to 7 in. The belt will reach 5 ft. below water and rise 8 ft. above it, and another range will rise to a height of 15 ft. above the water-line, and will be of 7-in. armour, running for a length of 360 ft. The same thickness of armour will protect up to the upper deck between the first and second turrets. There will be three armoured decks and robust bulkheads. A special system of armoured water-



FRENCH BATTLESHIP "JEAN BART."

tight compartments is intended for protection against damage from mines. The machinery will consist of small-tube boilers and Parsons turbines. Coal supply, normal 900, maximum 2700. There will be two rudders and the speed is to be 21 knots. Complement 1100.

Quadruple turrets. The quadruple turret was advocated by the Navy Staff and the Technical section of the Department of Naval Construction, and was approved, after much criticism, by the Superior Council of the Navy, by what is said to have been a rather narrow majority. The possibility of a single shell putting out of action a third of the ship's armament weighed heavily with some officers, but the majority thought that the advantages of simplicity of plan and economy of weight transcended any considerations of risk. The twelve guns, with mountings and turret gear, are approximately of the same weight as the ten like guns of the Bretagne class. There is some doubt as to the effect upon the ship of firing the full broadside of twelve guns, and the possibility of firing the four guns in a single turret at the same instant seems to be in question. M. Painlevé states in his report that there were some partisans of a return to 12-in. calibre, but in his judgment it would be wiser to think of a larger calibre than the 13·4-in., and he hopes the Department will consider the advantage of mounting guns of 14·5 or 15-in., in double turrets, so that future battleships may be provided with them. He has also some remarks on the question of speed, and says that 23 knots should be the minimum. He fears the new Fleet may not be able to bring a weaker enemy to action, while itself subject to be brought to action by a stronger enemy. Many officers, he says, object to the *rôle* of the tactical defensive, which is implied by the lesser speed.

No cruisers of any class are at present being built for the French Navy, but the flotillas are receiving numerous additions.

Destroyers. The Estimates of 1913 show that nine destroyers (740–50 tons, 18,000 H.P., oil fuel, 31 knots), the Bisson, Renaudin, Capitaine Mehl, Dehorter, Francis Garnier, Commandant Rivière, Commandant Bory, Magon and Mangini are to be completed during the year, and that the Commandant Lucas, Protet (same class), and a destroyer of 800 tons, belonging to the 1911 programme, will be in hand. Two 850-ton destroyers are to be laid down at Rochefort, the Enseigne Roux and Mécanicien-Principal Lestin, and one in a private yard; armament, two 3·9-in. guns and four 9-pdr.; complement, six officers and seventy-five men. The destroyers of the 715-ton class (31 knots) have been under trial, and the following are the mean full-power speeds: Bouclier, 33·4, Casque, 35·6;

Cimeterre, 32·75; Dague, 33·2; Fourche, 33·2; Faulx, 32·01. The smaller 23-knot destroyers, 450 tons, Enseigne Henry and Aspirant Herbert, have been completed, and have attained speeds respectively of 28·5 knots and 28·3 knots.

Sub-marines.

Eight submarines are to be completed this year—the Curie, Le Verrier, Euler, Franklin, Amiral Bourgeois, Néréide, Clorinde, and Cornélie. Ten others, Gustave Zédé and Q 94–102, will be continued, and three of 200 tons will be put in hand, one at Cherbourg and two at Toulon. They will have a surface speed of 20 knots, eight torpedo tubes, and a complement of three officers and thirty-seven men.

The submarines of the Brumaire class, laid down in 1911, are the first French boats to attain any real success with the use of oil engines. The submarine named has made her trials successfully, but all the boats have given trouble with their machinery, largely through inexperience. Now it is believed the difficulties have been surmounted, and that the boats coming forward and their successors will be satisfactory for high-sea work. All the predecessors of the Brumaire have been relegated to the coast-defence class of vessels. The large submarine Gustave Zédé, 800 tons (surface) and 1000 tons (submerged), 2400 H.P., 20 knots, has been delayed. She was to have had Diesel engines, but the contractors could not complete the work, and the vessel is being converted to receive steam machinery with oil fuel for surface navigation. The Franklin, of the 800-ton class, was launched at Cherbourg, March 22nd. The Mariotte, 530 tons, passed through her trials with complete success.

The mine-layer Cerbère, laid down at Saint Nazaire in August, 1911, has not yet been completed, and the 20-knot mine-layer Pluton has been launched at the Normand Yard, Havre. A gunboat, the Balny (214 tons, six 1·5-in. guns, complement fifty-five), and a coast transport, the Seine (3160 tons, 12 knots), are to be laid down.

Reorganised flotillas.

The flotillas have been reorganised. The destroyers which were distributed in the defensive formations of the ports, have been grouped and attached to the squadrons, as have also the larger classes of submarines. They are thus assigned to the work of the offensive, and only the smaller and older boats are attached to the local defences. M. Painlevé thinks the destroyers and submarines insufficient in number, and says that light cruisers of 25 to 30 knots speed are an urgent necessity, both for the Mediterranean and the Channel.

Manœuvres and exercises.

Not for many years has the French Fleet been so much at sea as in 1912. There were grand manœuvres during a period of three

weeks in July in the waters of Corsica and Algeria, terminating on the coast of Provence. There was a blockade of Ajaccio, which showed the disadvantages of the place as a base for a fleet if a stronger force is outside. Battle tactics followed, one squadron having its speed limited to enable the armoured cruisers to represent a squadron of high-speed battle-cruisers, while three divisions of destroyers of the First Squadron sought their opportunity, and, in broad daylight, bore down, at 18 to 20 knots, upon the Second Squadron, which opened fire upon them at 3500 yards. It was pointed out that a squadron would hardly dare to cross the track of a flotilla of destroyers, lest the boats should have dropped mines behind them. Many other exercises of a like kind followed, the main advantage being the sea experience and training given to officers and men. While this was going forward, the Third Squadron in the Channel was representing an enemy, for the test of the new arrangements, whereby the defence is entrusted to the coast flotillas. It seems certain that many officers drew conclusions adverse to the absence of a defending battle squadron. When the Third Squadron arrived in the Mediterranean, there were other important manœuvres and exercises, which took place in November, and included operations of blockade, torpedo attacks and battle tactics. In the course of the operations, the destroyers Fourche and Casque were in collision, the former having her stem bent and the latter some plates driven in.

Aviation service.

By decree of March 20, 1912, a naval aviation service was brought into existence, directed by a superior officer, and comprising a shore station, commanded by a naval officer aviator, with the Foudre as headquarters afloat, in association with the vessels of the flotillas. The staff have established a scheme with regard to the aviation service. There are to be in the Mediterranean, at suitable points, three centres for dirigibles. On the ocean and Channel coasts there will be one centre for dirigibles and two for aeroplanes. The financial programme involves an expenditure of well over £1,000,000 sterling, to be distributed over four years—1913–1916. The principal centre is now at Fréjus, where suitable hangars have been erected, and a slipway for the launching of aeroplanes has been laid down. The Navy has several aeroplanes, and Voisin, Nieuport and Bréguet hydro-aeroplanes. Three of the latter class proved their value in the naval manœuvres by discovering submarines and cruisers, and signalling their presence to the admiral.

Personnel.

A scheme has been presented to the Chambers for the reorganisation of the *personnel*, by making the sea service conform to that in the Army. The Fleet would therefore have men of two years' service

and volunteers, and the number of the former would depend upon that of the latter. The probability of the Army service being increased to three years may affect this proposal. The ancient Inscription Maritime has lost its principal value. It produces prime seamen of the best class, but comparatively few who can remain five years in the Service. Volunteers of better education are required for the numerous technical services on board modern ships, but it is yet uncertain how far the necessary number can be depended upon. In any case, considerable changes are impending.

M. Baudin has intimated his purpose of presenting a *projet de loi*, with the object of ameliorating the situation of officers. The main feature is the placing on the list for shore employment, in dockyards, depôts, etc., of a considerable number of officers, whereby a reserve would be created and promotion stimulated on the sea-service list. At the same time, the rank of *capitaine de corvette* would be established, mainly for the promotion of senior lieutenants.

Administrative reorganisation.

A change has been made in the administrative organisation at the Ministry of Marine. M. Delcassé suppressed the permanent inspectorates, which had been created by Admiral Boué de Lapeyrère. The Inspectors-General were four vice-admirals severally concerned with the squadrons, the *matériel* of the Fleet, the schools and depôts, *personnel*, and the submarine defences. For two years they conducted their work with activity, but gradually their duties were diminished, the exercise of their functions promised to cause friction, and for twelve months the office of Inspector-General of Schools and Depôts had not been filled.

Under the new arrangement the heads of the Service are responsible for the efficient execution of their own duties, though something of the principle of inspection remains. The Commander-in-Chief of the Fleet may be deputed to inspect forces not under his own orders; the Director of Works (*i.e.*, of the *matériel*) will be President of the Technical Committee and inspector of his own department; and the Director of the Fleet Services (*personnel*, etc.) will also be described as inspector of his department. These changes have caused a re-organisation of the Superior Council of the Navy. Its most important members are the Chief of the Staff, and the heads of the *personnel* and *matériel* services, who are constantly in association with the Minister, whereby business is enabled to be despatched promptly. The Commander-in-Chief of the Fleet is a member, and will take his seat whenever questions of sufficient importance to warrant his leaving his command are under discussion. Other vice-admirals commanding squadrons, the naval prefects, and the rear-admirals commanding in Algeria and Tunis may also be called in for

consultation. A plenary sitting under this organisation would include seventeen persons.

It used to be observed that a very important meeting of the Superior Council would have the effect of depriving all the principal squadrons of their chiefs. Difficulties of this kind seem to be inherent in the administration of navies which have no organisation corresponding closely to the Board of Admiralty in this country. In practice, however, and by force of circumstances, the administration of the French Navy has been placed upon a better footing, and by delegation of responsibility and simplifying of the system, with a reduction of red tape, the work goes on with unaccustomed smoothness and rapidity.

Programme. In April, the Minister announced his intention of presenting a Bill providing for accelerating the programme, three of the scouts to be begun in November, and for building three additional battleships, of which the first would be laid down in October.

Disasters. The Vendémiaire, submarine, of 398 tons, Lieutenant Prioul, was lost with all aboard by collision with the Saint Louis, flagship of the Third Squadron, in the Raz Blanchard, near Cape de la Hague, on the morning of June 8th during manœuvres. The squadron, on its way from Brest to Cherbourg, was proceeding in line ahead, the Saint Louis leading, the submarines endeavouring to attack, when the periscope of the Vendémiaire was perceived just ahead, and almost immediately the stem of the battleship struck the boat, which immediately went down in thirty fathoms, carrying with her twenty-four officers and men, and only an escape of air and oil and a few pieces of wreckage from the flying bridge indicated the place of the disaster. It was said that the sad misfortune was due to imperfection of the periscope, and that the periscopes of recent boats are not so good as those in the earlier boats.

On June 26th three men were killed on the spot and others seriously injured by the premature explosion of cartridges in loading successively two 6·4-in. guns in the Jules Michelet, which was the gunnery training-ship at Toulon. After the first disaster the exercise was continued with the object of maintaining discipline, when the second explosion occurred. All precautions had been observed, and the air jets to drive out gases of the previous charges had been in operation, but the committee of inquiry attributed the explosions to incandescent fragments having fired some residual combustible gas, whereby the explosion of the cartridges was caused.

A gun accident occurred on board the Danton in February, three men being killed by the bursting of a 12-pdr. at a point about 3 ft. from the muzzle.

Germany.

Amendment to the Navy Law.

Since the last volume of the *Naval Annual* was published, further important steps have been taken to increase the strength and readiness for immediate action of the German Fleet. The *Marine Rundschau*, in discussing the fresh development, said that Germany had for forty years pursued, and was still pursuing, a policy of peace, which she maintained by her strength, and recent events had shown her once more the truth of the old saying, *Si vis pacem para bellum.* A chapter in this volume is devoted to the expansion of the German Fleet, and there is little need to discuss here the recent amendment of the Navy Law. The important fact is that the creation of a Third Squadron of the High Sea Fleet has been sanctioned. The Cruiser Squadron will comprise four battle-cruisers when the Seydlitz relieves the Yorck. The vice-admiral commanding the cruisers—described as *Aufklärungsschiffe*—has now a second rear-admiral under him, and the command includes, in addition to the armoured vessels, eight of the protected class. The training and experimental ships have recently been formed into a Training Squadron (*Lehrgeschwader*), under the Inspector of the Torpedo Service, and in 1912 this squadron made two cruises of several weeks. Events in the Balkan Peninsula caused a Mediterranean Division to be constituted, consisting of training ships and small cruisers, and the Goeben was temporarily detached, with the Breslau, from the High Sea Fleet.

Speaking on the Supplementary Navy Estimate in the House of Commons on July 22, 1912, the First Lord endeavoured to explain the real significance of the amended Navy Law, and his remarks deserve to be recorded:—

> The main feature of that law (he said) is not the increase in the new construction of capital ships, though that is an important feature. The main feature is the increase in the striking force of ships of all classes which will be immediately available at all seasons of the year. A Third Battle Squadron of eight battleships will be created and maintained in full commission as a part of the Active Battle Fleet. Whereas, according to the unamended law, the Active Battle Fleet consisted of seventeen battleships, four battle or large armoured cruisers, and twelve small cruisers, in the near future that Active Fleet will consist of twenty-five battleships, eight battle or large armoured cruisers, and eighteen small cruisers, and whereas at present, owing to the system of recruitment which prevails in Germany, the German Fleet is less fully mobile during the winter than during the summer months, it will, through the operation of this law, not only be increased in strength, but rendered much more readily available. . . . Taking a general view of the effect of the law, nearly four-fifths of the entire German Navy will be maintained in full permanent commission—that is to say, instantly and constantly ready for war. Such a proportion is remarkable, and, so far as I am aware, finds no example in the previous practice of any modern Naval Power.

Programme.

The following table shows the German shipbuilding programme from 1913–1917, as modified by the amendment or *Novelle* of the Navy Law, 1912. An additional battleship is assigned to 1913 and another to 1916, and it must be observed that a third additional

battleship and two small cruisers are also in the programme, the dates for laying down which vessels have not been stated.

—	Battleships.	Battle Cruisers.	Total of Capital Ships.	Small Cruisers.	Destroyer Divisions.
1913	2	1	3	2	2
1914	1	1	2	2	2
1915	1	1	2	2	2
1916	2	1	3	2	2
1917	1	1	2	2	2

The three battleships of the 1909 programme—Oldenburg (22,500 tons), Kaiser and Friedrich der Grosse (24,310 tons)—have been completed and have entered the Service. The Oldenburg attained a mean speed of 22·2 knots on her trials, and the Kaiser of 23·6 knots. The Oldenburg belongs to the Helgoland class, but the Kaiser inaugurated a new class (described in the *Naval Annual* for 1912, p. 44), which includes the Friedrich der Grosse and the three battleships of the 1910 programme Kaiserin, König Albert and P.R. Luitpold, which are to be completed this year. The new feature is that their 12-in. guns are mounted in five turrets, of which three are on the keel line and two escheloned on either broadside. Battleships.

The following table shows the German battleships, battle-cruisers, and small cruisers of the 1911 and 1912 programmes.

—	—	Laid down.	Completion.
König	Wilhelmshaven .	September, 1911.	Autumn, 1914.
E. K. F. Wilhelm .	Vulcan, Hamburg .	May, 1811 . .	Autumn, 1914.
E. Weissenburg . .	Weser, Bremen .	October, 1911 .	Autumn, 1914.
E. Brandenburg . .	Germania, Kiel .	July, 1912 . .	Summer, 1915.
K.	B. & V., Hamburg.	Autumn, 1911 .	Spring, 1914.
E. Kaiserin Augusta.	Schichau, Danzig .	Autumn, 1912 .	Spring, 1915.
Rostock	Howaldt, Kiel . .	Autumn, 1911 .	Autumn, 1913.
Karlsruhe	Germania, Kiel . .	Summer, 1911 .	Summer, 1913.
E. Prss. Wilhelm .	Dockyard, Kiel. .	Summer, 1912 .	Summer, 1914.
E. Irene	Weser, Bremen .	Summer, 1912 .	Summer, 1914.

No official description has been given of the ships named in this list, save in the case of two of the small cruisers. Two battleships have been launched since the 1912 *Naval Annual* went to press, the König Albert, of the Kaiser class, at Danzig, April 27, 1912, and the König, a ship additional to the original programme, built under the designation of S, at Wilhelmshaven, March 1, 1913. The Ersatz Weissenburg and E. Friedrich Wilhelm will soon follow them into the water. The E. Brandenburg is reported to have made

very good progress. It has been stated that the armament is ten 14-in. and fourteen 6-in. guns. Possibly in the matter of armament the Ersatz Brandenburg, whose displacement is said to be 27,000 tons, may mark an advance. The Krupp firm have now guns built or designed of 14-in., 15-in. and 16-in. calibre, the latter perhaps a fortress gun. The lengths are 40, 45 and 50 calibres in each case. German designers have hitherto followed conservative lines in construction, but the great advances in armament made in other navies will certainly not leave them content with the 12-in. gun, and a 14-in. or 15-in. may be expected in the newer ships. All these vessels have Schulz-Thornycroft boilers and turbine machinery. The battleships to be laid down this year are the Ersatz Wörth and T., the latter an additional ship.

Battle-cruisers.

The German battle-cruisers are magnificent vessels in all respects The Goeben, third of the class, launched in March, 1911, 22,600 tons, completed her trials in August, and attained a speed of 28·6 knots, with a coal consumption less than the contract, while on the measured mile the speed is said to have been over 31 knots. She joined the Fleet August 28th. The Goeben has Schulz-Thornycroft boilers and engines of 70,000 H.P. The Seydlitz, which was launched March 30th last year, is of larger displacement—24,000 tons. K., which is about to be launched, and Ersatz Kaiserin Augusta are believed to be of 30,000 tons, and it has been stated in *The Engineer* that their engines will be of 100,000 H.P. They will probably mount heavier guns than the 12-in., besides having the large secondary armament of 5·9-in., which is so interesting a feature of their predecessors. The battle-cruiser to be begun in 1913 is the Ersatz Hertha.

Small cruisers.

Four small cruisers have been under trial during last year, and three, if not four, of them have been passed into the Fleet. These are the Magdeburg, Breslau, Stralsund, and Strassburg, all of 4500 tons, mounting (like all their predecessors from the Emden onward) twelve 4·1-in. guns. All four have Schulz-Thornycroft boilers; Magdeburg and Stralsund, Bergmann turbines, 22,300 S.H.P.; Breslau, A.E.G. turbines, 25,000 S.H.P.; Strassburg, Parsons turbines, 22,300 S.H.P. The Magdeburg and Breslau attained mean speeds of 27·5 knots on their trials, and the Stralsund of 28·3 knots, contract speed, 26·75 knots. Two other cruisers of the same class have been launched—the Karlsruhe (ex Ersatz Seeadler) at the Germania Yard, Kiel, on November 11th, and the Rostock (ex Ersatz Geier) at the Howaldt Yard, Kiel, on the following day. These are a little larger than the others—4830 tons—but carry the same armament, with two torpedo-tubes and a complement of 370. A remarkable feature of these cruisers is that they are armoured. They

have water-line belts 3·9 in. thick amidships, reducing to 2·3 in. at the extremities, and amidships the armour rises to protect the bases of eight of the 4·1-in. guns (four on each side), two others being mounted forward and two abaft. There is a 2-in. deck, and the conning tower has 3·9-in. armour. The fuel supply is 1200 tons, increased in the Karlsruhe and Rostock to 1400. It is supposed that the Ersatz Prinzess Wilhelm and Ersatz Irene will mount 5·5-in. or heavier guns. The two cruisers to be laid down this year are the Ersatz Gefion and Ersatz Hela.

Destroyers. It is expected that during the autumn the Seventh Destroyer Flotilla will be in commission, being eighty-four of such craft in all. A number of destroyers have undergone trials and been passed into the Service since the *Naval Annual* was last issued. Twelve are provided for every year, and are practically finished within the year, or within a few months later. The total legal establishment is 144. All the boats of 1911 are in the Service, and some of those of 1912 in addition. These are all vessels of 700 tons, all carrying two 3·4-in. guns and two machine guns, and having a speed of 32·5 knots. S 13 to S 24, which are being built by Schichau at Elbing, and appear to have been laid down very early, belong to last year's programme, and are increased in size to 900 tons, with 23,500 H.P., but their legend speed and armament are given as the same. All these are fine vessels, but they are probably not the equal of the Acasta and later British classes. It is said that they carry a 21-in. torpedo.

In July, G 110 was greatly damaged in collision with the Hessen and three lives were lost. She was saved with difficulty. On September 14th, G 171 was cut in two by the Zähringen, and went down in 16½ fathoms; seven lives were lost.

Submarines. There is a great development in the submarine branch of the German Navy, and the boats have been organised in flotillas, with two of the older destroyers as tenders and the small cruiser Hamburg as mother-ship and depôt. Eighteen submarines were built at the Germania Yard, Kiel, and at Danzig, and many more are in hand. One million pounds was devoted to the Service in 1912, and the same sum is to be expended this year.

An Imperial yacht is to be built to replace the Hohenzollern, which is no longer satisfactory in comparison with other Imperial and Royal yachts. A first charge of £250,000 is in the 1913 Estimates.

Provision is made for a gunboat and a storeship, and a Diesel motor boat is to be purchased for training purposes.

Works. Under the head of works some improvements are to be made at Wilhelmshaven. The torpedo establishment and depôt are to be

removed to the Mariensiel side. Attention is to be paid to the water supply of the port. Accommodation is to be provided for more vessels and harbour craft. Two tugs and an oil vessel are to be bought and a floating crane provided. At Kiel the electric power house is to be enlarged and additional plant provided, and the torpedo stores and works are to be extended.

A final grant of £9000 for the new torpedo range in the bay of Eckernfoerde is in the Estimates, and it is expected that the range will be in full use in the summer. The original plans have been amplified in view of the rapid development of the torpedo, and on its completion the range will have cost nearly £4000 more than was originally computed, the total reaching £68,000. Most of the money has been spent on buildings and dredging the course, which is to be equipped in the best manner for every sort of torpedo experiment. The principal Government torpedo factory is now at Friedrichsort, on the Kiel fjord, but it will probably be transferred to Eckernfoerde in the near future.

Naval air service.

The German authorities attach high importance to the use of aeroplanes and dirigibles in war. A flag-officer was appointed to direct the naval flying school at Putzig, near Danzig, assisted by a captain and a staff comprising five officers and an engineer. A number of flying machines have been added. The usual number of officers undergoing instruction at the Putzig school is from forty to fifty. A branch school exists at Johannisthal, near Berlin, where there is a teaching staff of five. As a rule, the officers and men detailed for instruction are first sent to Johannisthal to acquire the rudiments, whence on becoming fairly proficient they proceed to Putzig for a special course in hydroplane flying. At Johannisthal officers are specialising in airship work. With the acquisition of the first naval dirigible, the Zeppelin L 1, a beginning was made with an air fleet, and she will be followed this year by one if not two airships of larger dimensions. The scheme is to provide within a term of years two airship squadrons (five in each, including one in reserve), and fifty aeroplanes.

Grand-Admiral von Tirpitz said in the Reichstag that the Navy Department fully recognised its responsibility to increase the effective power of the airships. The Government propose to complete the necessary airship sheds this year by the aid of a Supplementary Estimate, and will make further comparative tests of the Zeppelin and Schuette-Lanz types of airships. It also hopes to procure a hydroplane of an eminently practical type. The Navy Department is also negotiating with a view to the laying out of aerodromes at Wismar and Rostock.

In regard to the *personnel*, the following facts are of interest. By the year 1920, 14,310 warrant and petty-officers and men will have to be added to the establishment, being an average increase of 1590 yearly, but in 1912–14, a larger proportion is being entered. By the same date 433 additional executive officers will be required, including two vice-admirals and one rear-admiral, entered at the average rate of forty-eight yearly, 316 engineer officers, being about thirteen yearly, 175 medical officers, and 119 paymasters and clerks. *Personnel.*

ITALY.

Peace was concluded with Turkey on October 19th. The Fleet had been mobilised during the whole period of the war, gaining no brilliant laurels, but engaged in convoying troops, guarding disembarkations, bombarding coast towns, destroying vessels, and generally in much blockade work. It was very arduous service, representing an aspect of naval activity which is sometimes little thought of. After the peace the Minister of Marine said that the object was not only to defeat Turkey but even more to prevent the intervention of a third Power.

Naval programme. Owing to the outbreak of hostilities in the Balkan Peninsula the Italian Fleet was not at once demobilised, and the dangers of the situation led to an agitation in the country for a further increase of the naval programme. A scheme was presented to the Chamber in December, which, however, owing to the opposition of the Minister of Finance, was restricted to rather modest proportions. The proposal adopted was to devote a further sum of £20,000,000 to naval purposes, distributing the outlay over a period of nine years, and adding the amount to the moneys provided by previous Laws, of which about £16,000,000 will be available before the year 1917. The Estimates for 1913–14, including about £427,000 for pensions, amount to £10,269,460, being an increase of £1,594,013, but of this sum £1,105,844 is for the Mercantile Marine, there being an increase owing to larger subventions. The total amount available for naval purposes is £10,400,000, including £1,540,000 taken by anticipation from funds provided by the Law of July 2, 1911, and the new Navy Law, the latter providing not more than about £300,000.

The eagerly-expected shipbuilding programme did not satisfy those who looked for a rapid expansion of the Fleet. The Finance Minister threatened resignation, and therefore the scheme will be analogous to those of 1905, 1909 and 1911, and the programme will be prolonged to the year 1920. Under Article 2 of the new Law provision is made for the completion of the battleships Duilio and

Doria, which are in hand, and for the building of two 6000-ton cruisers and the two cruisers Campania and Basilicata, 2550 tons, for Colonial service, as well as several torpedo craft, two submarines, of which one is under construction at Stettin, two oil transports of 6000 tons capacity, a transport and some auxiliaries. In this programme and its financial provisions neither the additional battleships Morosini and Dandolo, nor the Giuseppe Mazzini and Goffredo Mameli, which are to be laid down later in the year, are mentioned, but including loans, etc., about £4,000,000 becomes available for shipbuilding yearly, and the initial provision for the four battleships can thus be made.

The following table shows the battleships of the new programmes :—

—	—	Displacement.	Laid down.	Completion.
Dante Alighieri.	Castellammare	18,300	June, 1909 . .	October, 1912.
Conte di Cavour	Spezia . . .	21,500	August, 1910 .	Early 1914.
Leonardo da Vinci	Odero, Genoa .	21,500	July, 1910 . .	September, 1913.
Giulio Cesare .	Ansaldo, Genoa	21,500	June, 1910 .	September, 1913.
Duilio . . .	Castellammare	21,500	April, 1912. .	Early 1915.
Andrea Doria .	Spezia . . .	21,500	March, 1912 .	Early 1915.
Dandolo . . .	...	28,000	End 1912 . .	1915.
Morosini. . .	...	28,000	End 1912 . .	1915.

Battleships. In the *Naval Annual* of 1912, descriptions were given of the Dante Alighieri and Cavour classes. The Dante Alighieri joined the Fleet in October, having steamed at 23·82 knots on her six hours' trial, with maximum of 24·2 knots with 35,357 S.H.P.; gunnery trials, all three guns in each of the turrets, being fired simultaneously, gave full satisfaction. The design of these ships is one which shows again the disposition of Italian designers to purchase heavy armament and high speed at the cost of protection and perhaps some elements of stability. The Cavour will probably not be completed till 1914. The other two ships are to be completed this year. There has been delay in producing the armour, the great resources of Terni having been overtaxed, and the Carnegie and Bethlehem steel companies have undertaken some supplies. The Duilio and Andrea Doria are of the same type improved, carrying a main armament of thirteen 12-in. guns and sixteen 6-in., instead of eighteen 4·7-in. as in their predecessors. The Doria was launched March 30th. The Dandolo and Morosini, projected as part of a larger programme, are of a new class, carrying ten 14-in. guns, in two triple and two double turrets on the keel line, and twenty 6-in. guns in upper deck casemates. Their displacement is increased to 28,000 tons and

the engine-power to 48,000, and they are intended to steam at 25 knots; they will be entirely oil-driven. It is announced that two other vessels, the Giuseppe Mazzini and Goffredo Mameli, will be laid down at Castellammare and Spezia during the year, and that the Minister hopes to carry forward the programme with more expedition than was contemplated. In regard to the new type it is announced that a council of admirals approved, on February 11th, the following characteristics of a design by General Ferrati, of the Naval Construction Corps:—Displacement, about 35,000 tons; armament, twelve 15-in., in four turrets, and fourteen 6-in.; speed, 25 knots. Another design has been under consideration for a ship mounting nine 15-in. guns in three triple turrets on a displacement of 28,000 tons.

Small cruisers.

Of the small cruisers the Quarto, 3250 tons, which has undergone her trials at Venice, easily exceeded 28 knots. Length, 432 ft.; beam, 42 ft. 9 in.; draught, 13 ft. 3 in.; six 4·7 in., six 3 in.; 22,500 H.P., speed, 29 knots; complement 240. The Marsala and Nino Bixio, which are completing at Castellammare, are a little larger, 3400 tons; the guns are differently disposed, and the coal capacity is larger—800 tons as compared with 450. The Basilicata and Campania, 2550 tons, protected cruisers for colonial service, referred to above, were laid down at Castellammare in August.

A Turkish cruiser, which was in course of construction at the Ansaldo Yard, Genoa, for the Ottoman Government, has been purchased for the Italian Navy, the sum paid being £200,000, which does not represent the total cost of the vessel. The Turkish Government had not paid for the cruiser, and on being added to the Italian Navy she has been named the Libia. She is a sister ship of the Hamidieh, which was constructed at Elswick. She was launched on November 11th. Displacement, 3800 tons; two 6-in., six 4·7-in., eight 3-pdr., two above-water torpedo tubes.

Destroyers and torpedo-boats.

Of the ten 650-ton destroyers, which have been under construction by Messrs. Pattison at Naples (six boats) and Messrs. Orlando at Leghorn (4 boats), several have joined the Service. They are oil driven, with turbine engines of 15,000 H.P., and a contract speed of 30 knots, which has been largely exceeded, the Indomito having steamed at 33·5 knots. The Ardito was launched at Leghorn October 28th, and the Ardente December 15th. Fifteen additional destroyers are to be built under current votes and the Navy Law provision, and names have been given to four at Naples and nine at Genoese yards. They are intended to be large sea-going boats of 1000 tons, with designed speed of 32 knots. Messrs. Pattison are building at Naples six 130-ton torpedo-boats (33–38 P.N.), and two others are

in hand at Spezia. A destroyer, of 380 tons and 28·5 knots, was launched December 6th. An experimental torpedo-boat, 120 tons, built at Spezia, has been designated 39 R.M.

Sub-marines.

The submarines Giacinto Pullino and Galileo Ferraris, 400 tons, 18·14 knots (Cavillini type), have been completed at Spezia. The Nautilus and Nereide, 300 tons, are still in hand at Venice (Bernardi type). The F.I.A.T.-San Giorgio Company of Muggiano, Spezia, will deliver in May the eighth of their submarines for the Italian Government. These are named Medusa, Velella, Fisalia, Jantina, Salpa, Argo, Zoea, and Jalea. Displacement, 250–305 tons; 14·6–8·5 knots, and a range of 1300 miles at the latter speed on the surface. The Atropo has been launched at the Germania Yard, Kiel. Displacement, 240–330 tons; two Diesel engines of 350 H.P. each, for surface speed of 12½ knots; two electric motors for submerged propulsion, 8 knots; range 1300 miles on the surface, 40 miles submerged. Heavy oil engines, Augsburg-Nürnberg or F.I.A.T., are used in these boats.

The gunboat Sebastiano Caboto, 800 tons, intended for foreign service, has been launched.

Aviation.

Italian officers are entering with eagerness into the aviation service, and conditions have been laid down for their flights and pay. The cruiser San Marco has been equipped with a Pelham-Curtiss hydro-aeroplane, with which she exercised in Turkish waters.

AUSTRIA-HUNGARY.

Count Montecuccoli's retirement.

Admiral Rudolf Count Montecuccoli, Chief of the Naval Department, or Marine Commandant, retired from office on February 21st, on his 70th birthday, and was succeeded by Admiral Anton Haus, whose age is 62. Admiral Montecuccoli, who has been chiefly identified with the regeneration and recent expansion of the Austro-Hungarian Navy, has always been regarded as a sailor-statesman of a high order, and he was implicitly trusted by the Emperor, and regarded with respect in both parts of the monarchy. He won his way with the Delegations, and secured warm approval for his shipbuilding programme. His successor, Admiral Haus, who had been selected for the appointment some months earlier, is an officer of much experience and of high scientific attainments. It was stated before Admiral Montecuccoli retired that the Naval Department would be separated from the War Department, and made an independent Ministry, but this has not yet been done, and the measure would imply some constitutional change, owing to the fact that the number of Ministers

common to the two parts of the monarchy is limited. In practice the Marine Commandant is independent.

The period of Admiral Montecuccoli's rule has been one of great importance, and has profoundly affected the situation in the Adriatic and Mediterranean. More recently the course of events in Eastern Europe has caused the Austro-Hungarian Navy Department to take into consideration the need of still more rapidly expanding the Fleet. The special extraordinary credit for the new programme was to cover the years 1911–1915, with a possibility of some of the money being expended in the following year. Admiral Count Montecuccoli had a very cordial reception from the Delegations of both parts of the monarchy when he explained his fresh proposals. The Delegates were under the immediate impression of the war in the Balkan Peninsula, and the necessity of replacing the three ships of the Monarch class was fully admitted. It was accordingly announced, in September, that Admiral Montecuccoli would present proposals for replacing the vessels by a division of modern battleships, and that special financial arrangements would be made. It is anticipated that the three ships will be laid down early in 1914. Proposed new programme.

The Marine Commandant obtained a special credit of £1,670,000, additional to the ordinary and extraordinary Estimates, and also to the extraordinary budget for new construction, which provides for further war supplies and for beginning work upon two 450-ton Danube monitors, a vedette, six additional sea-going 250-ton torpedo boats, and a floating dock of 40,000 tons capacity, and for extending the aviation service.

VESSELS OF THE NEW FLEET.

—	—	Displacement.	Laid Down.	Completion.
Viribus Unitis	Trieste	20,000	July, 1910	Sept., 1912
Tegetthoff	Trieste	20,000	Sept., 1910	Spring, 1913
Prinz Eugen	Trieste	20,000	Jan., 1912	Spring, 1914
VII.	Fiume	20,000	Jan., 1912	Autumn, 1914 (?)
Saida	Trieste	3,500	Sept., 1911	1913
Helgoland	Fiume	3,500	Oct., 1911	1913
Novara	Fiume	3,500	Nov., 1911	1914

The four battleships of the Viribus Unitis class were described in the *Naval Annual* last year (p. 52), and particulars will be found in the tables. The distinguishing feature is that the ships mount twelve 45-calibre 12-in. guns in four triple turrets in the middle line, so planned by the superior elevation of the inner turrets that six guns Battleships.

fire ahead and six astern, with the whole twelve on the broadside, each turret with an arc of fire of 300 degrees, and a total weight of discharge of 11,904 lb. The Viribus Unitis completed her trials with success, and has joined the squadron, though she is still apparently regarded as in an experimental stage. Her turrets, built by the Skoda Co., weighed more than was intended, but did not increase the draught by more than 1½ in. She exceeded the contract speed of 21 knots by ⅘ths of a knot on her trials, and during her gunnery trials she fired a broadside of twelve 12-in. guns with full charges, giving competely satisfactory results. She was launched a year and a day after being laid down, and completed within twenty-six months. The second ship of the class, Tegetthoff, was launched at Trieste, March 21, 1912, and when completed will have been in hand over three years. The third ship, Prinz Eugen, was laid down on the slip vacated by the Viribus Unitis, in January, 1912; and she was launched November 30th, and is to be completed early next year. The fourth ship, yet unnamed, and known as No. VII., was laid down in January, 1912, at the Danubius yard, Fiume, and should be completed in the autumn of 1914, but delay is anticipated. The Danubius Co. has built two fine masonry berths for the largest ships, but the rocky situation made much heavy excavation necessary, and delay resulted.

Plans have been prepared for the battleships which are to be laid down in lieu of the Monarch class. It is said that they will be armed with eight 15-in. guns, will displace 25,000 tons, and will have a speed of 24 or 25 knots.

Small cruisers. The three small cruisers of the Admiral Spaun class (improved) have been launched, the Saida at the Cantiere Navale, Monfalcone, Trieste, October 26th; the Helgoland at the Danubius yard, Fiume, November 23rd; and the Novara also at Fiume, February 15th. Displacement, 3500 tons; armament, nine 3·9 in., three 3 pdr.; speed, 27 knots; 2½-in. water-line armour.

Torpedo craft. Six 800-ton 32½ knot destroyers are making good progress—the Tatra (launched November 5th), Balaton (November 16th), Csepel (December 6th), Likra, Orjen and Triglav. They have Yarrow boilers; oil fuel.

Twelve 250-ton torpedo-boats have been put in hand—four at Fiume, and eight at the Stabilimento Tecnico, Trieste, as part of the special programme. Nine other boats of the same class, to replace obsolete boats, are provided for in the ordinary votes of 1913, and, as is stated above, six are to be built under the special supplementary vote.

The first Austro-Hungarian submarines were built as follows:—

Two (Lake type) at Pola, two (Germania type) at the Germania yard, Kiel, and two (Holland type) at the Whitehead yard, Fiume. These approximated 300 tons submerged and 230 tons on the surface. Six boats of 500 tons were to be built as part of the special programme, but the money voted provided only for four. In February an order for five boats was placed with the Germania yard, Kiel, the Marine Commandant explaining that no national yard could build the boats at the price.

A mining vessel of 1000 tons displacement is in hand. Two 7000-ton colliers are to be begun this year.

The partial reconstruction of the Habsburg class is in progress. The Habsburg herself and the Babenberg are out of hand, and work upon the Arpad is in progress. Her superstructure is being reduced.

Floating docks.

A steel floating dock for destroyers and small craft, which is to cost about £42,000, is approaching completion. An order has also been placed with Messrs. Blohm and Voss, of Hamburg, for a floating dock of 40,000 tons capacity, provided for by the supplementary vote. Only one Austrian establishment seriously tendered for the construction of the dock, and its price was considerably higher than that of the German firm.

Personnel.

Provision is made in 1913 for the addition of one rear-admiral, three captains, five commanders, thirty-one lieutenants, twelve junior officers, one chaplain, five surgeons, twenty-seven engineer officers of various ranks, and several accountant officers. The Naval Department considers it essential to add 7000 men, provided by a contingent of 5500 in 1913, and henceforward of 6000, whereby it is calculated that the standing *personnel* would within four years be increased from 14,000 to 21,000 petty officers and men.

Works.

Work continues upon the coaling and torpedo station at Teodo, the fifteenth instalment appearing in the votes of 1913. Enlargements and changes are also continuing at the Vallelunga magazines. The enlargement of the building berth at Pola is nearing completion. Barracks, workshops, oil tanks, wireless telegraphy equipment, artificers' dwellings, an oil depôt, stores, mechanical and torpedo shops, plant, etc., are being provided for. The mine depôt at Fisella will be completed. The entrance between Sant' Andrea and Santa Catarina in the harbour of Pola is being dredged. It is announced that the Stabilimente Tecnico of Trieste intends to open a new shipyard at Medolina, a few miles from Pola.

Summary figures from the Estimates of 1913 will be found in Part IV., where it will be seen that the expansion of the Fleet is accompanied by a consequent increase in expenditure alike for

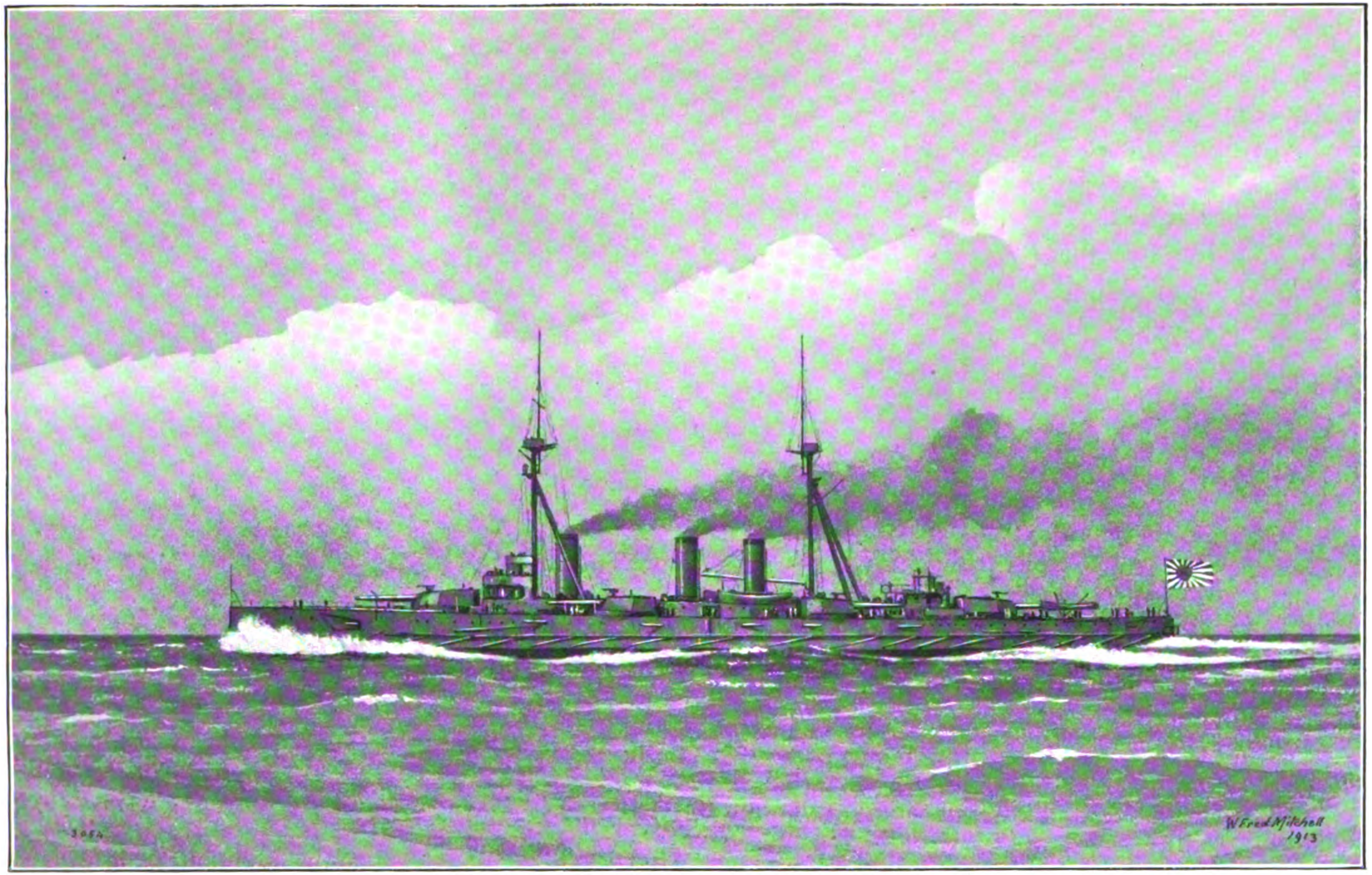
matériel and *personnel*. The expenditure is divided in the proportion of 63·6 per cent. for Austria and 36·4 per cent. for Hungary. The first four Dreadnoughts (Viribus Unitis, Tegetthoff, Prinz Eugen, and No. VII.) are estimated to cost together £10,000,000 in round figures. Expenditure began in 1911, and the third instalments are in the Estimates of 1913, except that in the case of the guns and torpedo armament of the Prinz Eugen and No. VII. only the second instalments have been reached. It was intended that the final charges should be in 1915, but it has now been determined to accelerate construction, so that the ships may, if possible, all be completed by the end of 1914.

JAPAN.

When the cabinet of Prince Katsura was formed in December, Vice-Admiral Baron Saito was provisionally included as Minister of Marine. The Baron, who had held the same office in the previous Cabinet, had had a long struggle with the economists, and had been compelled to restrict his programme. Prince Katsura's plan was to submit the whole subject of the naval and military defences to a Commission with a view to retrenchment, but his proposal aroused very strong feeling amongst the Satsuma Party, who practically control the Navy, and Baron Saito refused to accept office, after a conference with a number of flag officers, including Admirals Yamamoto, Togo, Marquis Inouye, Baron Ito and Baron Kamimura, who held naval expansion to be vital for the safety of the empire. Upon this a Council of the Genro was called, and being summoned before the Emperor, Baron Saito was instructed, by edict, to continue to hold the naval portfolio.

Finances of the Navy.

Every recent programme of construction formulated in Japan has struck upon the rock of the financial difficulties of the country. The importance of the Navy is not denied by anyone, but there are doubts as to the sufficiency or otherwise of successive programmes, owing to the exact objects of the Fleet—the enemy it is expected to encounter—not being defined. It is contended in some quarters that the Army is too large, and absorbs far too much money, and in others that the *personnel* of the Navy is in excess of its requirements. The matter is complicated by the strong desire that exists in the country to escape from European tutelage, and large sums have had to be expended in improving ports, harbours and docking accommodation, and in creating great steel works where guns and armour can be produced.



JAPANESE BATTLESHIP "KAWACHI."

The reduced programme 1913–17, which has been referred to, would give Japan in the latter year twelve vessels of Dreadnought type, being four battleships of the Kawachi and Satsuma classes, with the Fuso, and three additional ships proposed to be laid down, and of battle-cruisers the Kongo, built at Barrow, and three others which are under construction in Japan. The larger programme included eight battleships and eight battle-cruisers, with sixteen scouts and forty-eight destroyers. Since the Katsura Cabinet assumed office, the subject of the naval programme has again been considered, and to Admiral Takarabe was entrusted the duty of preparing a scheme. He has assumed that a potential enemy might be expected to have twenty-one battleships and battle-cruisers. The programme based on this conception would not vary the reduced programme of last year in the matter of battleships, three being proposed, but it includes a scheme for the eventual construction of eight battleships, four battle-cruisers, eight scouts and forty destroyers, at a cost of £36,000,000, which is £18,000,000 less than would have been absorbed by the larger programme, according to some estimates. The situation is not at all satisfactory to the Navy, and it is pointed out that there will be shrinkage rather than expansion, because, before 1917, the Fuji, Shikishima, Mikasa, Sagami (ex-Persviet), Hizen (ex-Retvizan) and Suwo (ex-Pobieda) will have gone off the lists. Programmes.

The following table shows the Japanese battleships and battle-cruisers of recent and current construction:

—	—	Displacement.	Laid down.	Completion.
Kawachi	Kure	20,800	April, 1909	September, 1912
Settsu	Yokosaka	20,800	January, 1909	October, 1912
Fuso	Kure	31,000	March 3, 1912	July, 1915
Kongo	Barrow	27,500	January, 1911	July, 1913
Hiyei	Yokosaka	27,500	November, 1911	Late 1914
Haruna	Kobe	27,500	March, 1912	Late 1915
Kirishima	Nagasaki	27,500	March, 1912	Late 1915

The Kawachi and Settsu were described in the *Naval Annual* last year. They joined the Fleet in 1912 and took part in the manœuvres, the former as flagship of Admiral Dewa. They were respectively forty-three and forty-two months from the date of laying down to that of commissioning. They gave complete satisfaction during trials. The Fuso, which was laid down at Kure, March 11, 1912, will, when launched, be the largest battleship afloat. Her displacement is variously given as 30,000, 31,000, and 31,300 tons, and Battleships.

her armament as consisting of twelve 14-in. and sixteen 6-in. guns. She is to have Myabara boilers, and turbine machinery of 45,000 H.P., providing for a speed of 22 knots. Great interest attached to the fact that the armament is to be produced in Japan, the Muroran steel works making the gun-tubes, and the Kure arsenal the breech blocks and other important parts. This division of work apparently applies also to the turrets and gun mountings.

Battle-cruisers. The battle-cruiser Kongo was launched by Messrs. Vickers, at Barrow, May 18, 1912, and a sister battle-cruiser, the Hiyei, at Yokosuka, on November 21st. Two others are in hand—the Haruna at the Kawasaki yard, Kobe, and the Kirishima at the Mitsubishi yard, Nagasaki. These are vessels of 27,500 tons, with length of 704 ft., 92 ft. beam, and 27½ ft. draught. Their main armament consists of eight 14-in. guns in four barbettes on the keel line, the inner barbettes firing over the others, so that the direct ahead and astern fire is four guns, while all the guns fire on the broadside. The secondary armament consists of sixteen 6-in. guns in casemates on the upper deck level, and sixteen smaller guns. The Osaka *Mainichi* states that the armaments of the three vessels building in Japan will be produced, like that of the Fuso, at Muroran and Kure. The water-line armour of these vessels extends well below the surface, and under it there is an auxiliary belt. The side armour is carried to the height of the boat deck, and is continued on the same level as the forecastle, constituting a citadel, in which are the casemates of the 6-in. guns. An armoured deck runs from end to end, and there are two other armoured decks. The propelling machinery is calculated to develop about 70,000 S.H.P., giving a speed of at least 28 knots. There are two independent sets of engines, separated by a longitudinal bulkhead, and each forming a complete unit with its own auxiliaries. Each set comprises a high-pressure and a low-pressure turbine, the former driving the outer shaft and the latter the inner one in each case, and on each shaft, aft of the ahead turbine and in the same casing, there is an astern turbine—high pressure on the outer shafts and low pressure on the inner—so that all four screws can be used for reversing. The high-pressure turbines, both ahead and astern, are, in three of the ships, of the Parsons combined impulse and reaction type, while the low-pressure ones are of the reaction type. The Haruna will have Curtis turbines. Steam is supplied to the Parsons turbines, at a pressure of 205 lb. per sq. in., from thirty-six boilers of the Yarrow large-tube pattern, placed in eight separate compartments, four on each side of a longitudinal bulkhead. Arrangements are made for burning both coal and oil; the capacity for the former is

4000 tons and for the latter 1000 tons. There are three funnels and two masts. The ships building in Japan will have Myabara boilers.

The protected cruisers Yahagi, Hirado and Shikuma, 4800 tons, were completed last summer and joined the Fleet. They passed successfully through their trials, and the two first named took part in the manœuvres. **Protected cruisers.**

The large destroyers Umikase and Yamakasi, 1200 tons, 35 knots, have been completed. The former averaged 34·5 knots on trial. The Sakura and Tashibana, which are of 900 tons, have been launched, and two others have been laid down. **De-stroyers.**

Not much is known about the submarine programme. There are fifteen boats, of which the latest have been built and are completing at the Kawasaki yard, Kobe, and are of large sea-going character, and will carry two guns. **Sub-marines.**

The Japanese air service is developing rapidly. A German dirigible, built as Parseval XIII., was taken over in April, 1912, and several aeroplanes of American and French construction have been secured, while some naval officers have been sent abroad for training. During the manœuvres Farman and Curtiss hydro-aeroplanes made remarkable flights. **Dirigibles and aero-planes.**

Russia.

The progress made by the Russian Navy during the past twelve months is probably more worthy of notice than that of any other foreign Navy. The acceptance of the Admiralty proposals by the Duma last June, by the enormous majority of 228 to 71, was regarded as the most important indication of Russia's policy disclosed for many years past, and the results are already exercising an influence on the Baltic situation. Admiral Grigorovitch has won confidence for the naval administration which has for many years been wanting. His plans are organic, and affect every part of the administration. A complete reorganisation of the national resources for naval construction, implying a radical change in the position of the State yards and the practical creation by progressive steps of a national shipbuilding industry, a new naval programme, and the adoption of a new ice-free base for the Baltic Fleet are the salient parts of the scheme. Equally sound, but not so easily traceable, are the changes which are being introduced in the training and organisation of the *personnel*. **The new Navy.**

The Government secured legislative sanction for all that has **Pro-grammes.**

been done, and there has been no further exercise of the Imperial prerogative, which recently overruled the action of the Duma by providing certain of the funds for the four battleships of the Sevastopol class. The new proposals, which have been adopted, include what is known as the "small programme," but the lines of development are indicated, and until the national yards and establishments are capable of working alone, foreign help is to be employed upon a principle which has been definitely laid down. Such is the importance of the scheme that it will be well to describe the general features before dealing with the programme or the ships in hand. The total sum authorised is given as £80,000,000, and an expenditure of £50,200,000 has been provided, to be expended during the five years 1913–1917, with a preliminary charge in 1912, on the creation of the new base at Reval, the reorganisation of the dockyards, and the expansion of the Fleet. For shipbuilding, over £39,000,000 will be required, and of the remainder a large sum will be devoted to providing the requisite resources at the new base at Reval, and upon improvements at Kronstadt, Sveaborg, Sevastopol, Nikolaieff, and Vladivostok. The total of £50,200,000 will be distributed for expenditure as follows:—1912, £1,000,000; 1913, £10,400,000; 1914, 1915, and 1916, £10,200,000 each; 1917, £8,200,000; but the Admiralty asked for an immediate grant of £1,500,000 so that certain work could be put in hand without delay. The Act was approved by the Council of the Empire in the form in which it left the Duma June 30, 1912.

Administration.

This new burst of activity in the Russian Navy may be said to have had its origin in a regulation of October 10, 1911, which strengthened the position of the Minister of Marine by placing under his immediate authority the Chief of the Staff, who had hitherto received orders direct from the Emperor. Upon this followed a strengthening of the authority of the Director of Naval Construction, who had constantly and for years been engaged in a controversy with technical committees, which are now reduced to the exercise of consultative functions only. There are still great obstacles to progress—perhaps the chief of them being the insufficiency of the constructive resources and the want of highly skilled artisans in sufficient numbers. The situation of the naval ports, the need of adapting them to new uses, vast dredging work to be accomplished, and the necessity of constructing masonry works, docks, ranges, and other requirements, are other difficulties. But the objection to Fleet expansion has been overcome, and those who would have reduced naval effort to the provision of coast-defence craft have not succeeded in swaying the authorities. It may be added that under

the Minister of Commerce the harbours of St. Petersburg, Libau, Nikopol-Mariupol, and Rostovsk are being dredged and improved, and the Kertch-Yenikale canal deepened, and other harbour work undertaken.

BATTLESHIPS IN HAND.

—	—	Displacement.	Laid down.	Completion.
Petropavlovsk . . .	Baltic Yard .	23,000	June, 1909 .	1914
Sevastopol	Baltic Yard .	23,000	June, 1909 .	1914
Poltava	Admiralty Yd.	23,000	June, 1909 .	1914
Gangut	Admiralty Yd.	23,000	June, 1909 .	1914
Alexander III.* . .	Nikolaieff .	22,500	October, 1911 .	1915
Impta. Maria* . .	Nikolaieff .	22,500	October, 1911 .	1915
Ikaterina*	Nikolaieff .	22,500	September, 1912	1915

* Black Sea.

The first four Dreadnoughts in the Baltic have been delayed beyond the intended time, and their slow progress is one indication of the difficulties which the Minister is endeavouring to overcome. They cannot be completed before next year. This, however, is regarded as encouraging, and Admiral Birileff, who reported on estimates, had observed a certain acceleration of the work. Four battle-cruisers, of about 30,000 tons, are to be built at the same yards, and to be named Borodino, Navarin, Ismail, and Kinburn, and the keel-plates were laid December 19th, but work upon them has scarcely yet begun. A great deal of work at the Admiralty Yard was undertaken after the vote of the Duma, and the establishment is united to the Galerny Island Yard. The berth upon which the Poltava and Gangut had been built was too small for the construction of the Borodino and the Navarin, which will require about 110 ft. width on the slip. The roofs have had to be removed, the berths lengthened, the walls cut down, and the old cranes replaced by new. Special preparations have also had to be made at the Baltic Yard, and an arm of the Fontanka has been deepened to provide completing berths for the Poltava and Gangut. All these works occupy time, but it is hoped to complete the four big ships within four years—that is, in 1917. As to the three battleships in the Black Sea, the Russian Government having renounced shipbuilding in its own establishments, two are built by the Ivanoff & Bunge combination at Nikolaieff and one at the naval construction works at the same place, in which Messrs. Vickers have a large share. These ships generally resemble those built at the Baltic. The

Battleships.

Kronstadtski Viestnik says they will be completed six months earlier than the anticipated date, which was 1916.

Protected cruisers.

The programme includes four protected or light cruisers for the Baltic, 6500 tons, of which two are to be built by the Putiloff Yard, working in combination with Messrs. Blohm & Voss, Hamburg, and two by the Russian Company at Reval, which has entered into relations with the French Creusot Company and the German Vulcan Yard. These and other combinations are recognised and approved by the Russian authorities as necessary in the present condition of the national establishments. Two cruisers of the same class are to be built for the Black Sea by the combined companies at Nikolaieff. In January the Russian Admiralty placed an order with Messrs. Schichau, at Elbing, for two smaller cruisers, 4500 tons, which will be of the recent German Kolberg small cruiser, 27½-knot, type. The intention was to build every ship in Russia, but these cruisers were required for training the engineering *personnel*, and they were ordered at the Elbing Yard, where they are to be completed by July 15, 1914. They are to cost £350,000 each. It is practically certain that all these Russian cruisers will have side armour.

Destroyers.

The full programme (1912–17) includes thirty-six destroyers for the Baltic, of which eight will be built by the Putiloff Yard, St. Petersburg; eight by the St. Petersburg Metal Works; five by Lange-Becker at Reval (which establishment is in association with the Normand firm at Havre); six by the Russian Company at Reval; and nine at Reval by Herr Ziese, who is the chief of the Schichau firm at Elbing and Danzig, and works in combination with them. It is stated that these destroyers will be of 800 tons.

The large destroyer, Novik—built at the Putiloff Yard from a design by the Vulcan Yard at Stettin, which has also supplied her A.E.G. turbines—has undergone her trials, attaining a speed of 36·2 knots. Displacement, 1200 tons; 336 ft. long; 31 ft. 3-in. beam; 8 ft. 7-in. draught; 30,000 H.P.; contract speed, 36 knots; armament, four 4-in. and four machine guns, with four torpedo tubes for 18-in. torpedoes, which are said to be double. She is to be used as scouting vessel of the cruiser division. The nine destroyers of 1100 tons, which are building for the Black Sea, at Nikolaieff and elsewhere, will carry three 4-in. guns, and it is said will have five twin 18-in. torpedo tubes. They are to steam at 34 knots, with turbine engines of 25,000 H.P. Their complement will be ninety-three officers and men. The names are Bespokoiny, Bystry, Dersky, Gnievny, Gromky, Pospieschny, Prontsitelny, Pylky, and Stashastlivy.

A large Bubnoff submarine, 500 tons, is being built for the Baltic out of collected funds, and twelve more are to be built—orders having been given in October—eight of them by Nobel & Lessner, St. Petersburg, two by the Baltic Yard, and two by the New Admiralty Yard. **Sub-marines.**

For the Black Sea three large Bubnoff boats are completing—the Morsch, Nerpa, and Tiulen—460–610 tons; Diesel engines, 1200 H.P., 15 knots; submerged, electric motors, 800 H.P., 11·5 knots; nine torpedo tubes. Three others of the Holland type improved—the Kashalot, Kit, and Narval—are also being built for the Black Sea, where the Krab was launched last year at Nikolaieff. The latter is a remarkable vessel, of the Naletow type, of 500–700 tons. She has Curtis turbines and electric motors, and is provided with two tubes and with an equipment for laying mines, of which she will carry sixty. She has been four years under construction.

Old warships to the number of about fifty have been scrapped, and others will soon be struck off the list.

There has been great activity in affairs concerning the *personnel*. Trouble, however, recurred in the Black Sea, where a mutinous spirit was disclosed, and stringent measures were adopted. *Personnel.*

On November 20th the number of vice-admirals was increased from sixteen to eighteen, and of rear-admirals from twenty-six to twenty-nine. Wireless telegraphy and submarine and flying schools or officers are in full operation.

A school has recently been opened at Kronstadt, through which about 400 youths of the age of eighteen will pass yearly. The first training will extend over eighteen months, including sea service, and the total obligation is six years.

As showing the new spirit at work in the Russian service, it may be noted that a special commendation was addressed to the port authorities at Kronstadt and the company of the Cesarevitch for completing the docking and partial refit of that ship within three weeks, which had been expected to take twice the time.

The air service is becoming of great importance, and the flying branch of the officers' ballooning school has been given an independent existence. As in the matter of ships, a great effort is being made to use only Russian apparatus. The large airship Albatros was completed by the Ishorsky Company at Zaliozi, near Gatschina, in October. A considerable number of aeroplanes are in the Service. At Sevastopol, in November, the foundation of a large flying school was laid. **Air service.**

United States.

Naval Secretary's report.

In a message to Congress last December, President Taft enforced the needs and claims of the Navy. He said the Fleet was in a state of higher efficiency than ever before, but that the slightest halt in naval expansion would reduce the United States to a second-rate naval Power. In the previous year Congress had refused supplies for more than one battleship, and he urged that the opportunity came for the mistake to be rectified by adopting the recommendations of the General Board, which are indicated below.

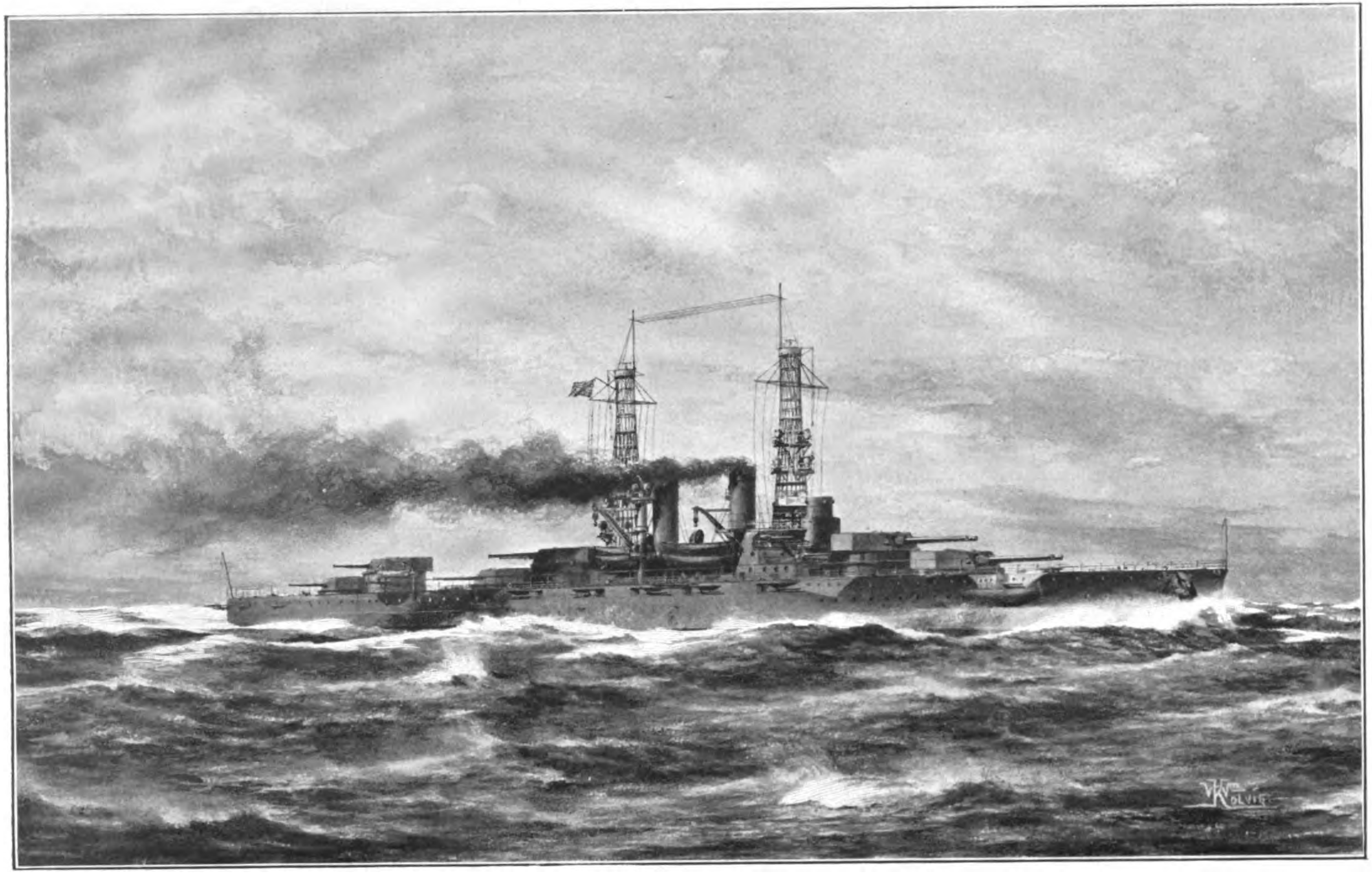
Mr. Meyer, in his last report as Secretary of the Navy, also strongly enforced the naval necessities of the country. The history of all times, including the present, had shown the futility and danger of trusting to the good will and fair dealing, or even to the most solemnly binding treaties, between nations for the protection of a nation's sovereign rights and interests; and, he said, the time was remote when a comparatively unarmed and helpless nation could be reasonably safe from attack by ambitious, well-armed Powers, especially in a commercial age such as the present. The economical system of a great commercial nation was so delicately balanced that even a threat of war was very disturbing and harmful, while a war with any other great Power would cause incalculable damage. To avoid war, therefore, and insure peace the country must be prepared for war. The Secretary insisted upon the importance of maintaining the establishment of forty-one battleships, with a proportionate number of fighting and auxiliary vessels, by replacing obsolete vessels. He strongly urged that the recommendations of the General Board should be approved by Congress. The new Naval Secretary is Mr. Josephus Daniels.

Programme recommended.

The recommendation was for the following new construction:—Four battleships, two battle-cruisers, sixteen destroyers, one destroyer tender, two transports, one ammunition ship, six submarines, one submarine tender, one supply ship, two gunboats, two sea-going tugs, one dry dock, one submarine testing dock. The battleships would merely replace four others which would be twenty years old in 1914; battle-cruisers must not be built if the battleship programme was to be affected thereby; the destroyers were necessary in the proportion of four to each battleship; all the other vessels were required for the real needs of the Service. There was great opposition to the proposals, and when the Appropriation Bill was passed by the House and the Senate it provided only for one battleship, six destroyers, four submarines, a transport and a supply ship.

Actual strength.

Apart from the relative position of the United States Fleet, its



UNITED STATES BATTLESHIP "ARKANSAS."

actual expansion was shown by the mobilisation of 1912 and the review at New York from October 12th to 15th, as compared with the mobilisation of 1911:—

—	1911.	1912.	Increase.
The Fleet:—			
Battleships	24	31	7
Armoured cruisers	2	4	2
Smaller vessels	72	88	16
Displacement . . . . tons	576,634	720,486	143,852
Personnel:—			
Officers	1,124	1,300	176
Enlisted men	25,378	27,464	2,086

Simultaneously with this mobilisation of all available vessels in the Atlantic at New York, there was a similar mobilisation at Manila of all vessels that could be assembled there. The mobilisation of 1912 was notable for the fact that eleven vessels had been completed and commissioned within the year, and that these included the Arkansas and Wyoming, which are the first, and probably the last, United States battleships to carry a main armament of twelve 50-calibre 12-in. guns.

These vessels, the Arkansas and Wyoming, 26,000 tons, which have been built respectively by the New York Shipbuilding Company and Messrs. Cramp, belong to the programme of 1909. They were constructed within less than three years from the date of the contract to that of commissioning, and within two years and eight months from the laying of the keel to completion. They began their trials in June and July, 1912. The contract speed was 20·5 knots, and the maximum of the Arkansas was 21·49, the mean of the four-hours' run being 21·05 knots, and on the twenty-four-hours' trial 19·41 knots. The ships burn both coal and oil. The Arkansas had suffered some slight damage through touching a reef off Rockland, Maine, but the trials proceeded, and the damage was afterwards made good at the Philadelphia Navy Yard. The Wyoming attained a maximum of 22·05 knots, with 333·6 revolutions, and her mean speed was 21·22 knots (31,437 S.H.P.). Battle-ships.

BATTLESHIPS IN HAND.

—	—	Displacement.	Laid down.	Completion.
Texas . . .	Newport News .	27,000	April, 1911	Early, 1914
New York . .	New York . .	27,000	Sept., 1911	Early, 1914
Nevada . . .	Quincy . . .	27,500	May, 1912	January, 1915
Oklahoma . .	New York . .	27,500	May, 1912	January, 1915
Pennsylvania .	Newport News .	31,400	May, 1913	Early, 1916

The Texas and New York, 27,000 tons, which were described in the *Naval Annual* last year, were launched respectively at Newport News on May 18th and at the New York Navy Yard on October 30th. They were authorised in June, 1910, and begun respectively in April and September, 1911. The New York was over thirteen months on the stocks, and had been carried forward 60 per cent. towards completion when she entered the water. With this class of battleships the 14-in. 45-calibre gun was introduced, and there will be ten of them in double turrets on the keel line, as well as twenty 5-in. guns, the latter being mounted five on each side in the citadel, one on each forward corner of the superstructure, and a group of two on each side on the bow and quarter.

Nevada class.

The Nevada and Oklahoma, 27,500 tons, which belong to the 1911–12 programme, were laid down by the Fore River Company and the New York Shipbuilding Company last May, and are to be complete in January, 1915. They are being constructed under the eight-hour restriction, which causes great complication, and as a consequence no tenders were received in strict accordance with the plans and specifications. The chief features of the ships are that their ten 14-in. guns are mounted on the keel line in two triple turrets forward and abaft, and two double turrets, which fire over the others, that they are very heavily protected as a result of the lessons of the San Marcos firing (*see Naval Annual* 1911 and 1912), and that they burn oil exclusively. The length of the ships is 575 ft., and 13½-in. armour will extend for a length of more than 400 ft. The bases of the outermost turrets are thus protected, and the armour extends beyond these for some distance, where bulkheads cross the ship. Except at the after end, the armour extends 9 ft. above the surface and 8 ft. 6 in. below, where the thickness is reduced to 8 in. There are steel decks of 1½ in. and 3 in. The gun-turrets are protected by 13-in. armour, except where they are covered by the side armour, and the barbettes have 18-in. armour on the outermost turrets, and 16-in. on the others, with 9-in. sides and 5-in. roofs. The conning tower and signal station have 16-in. armour, and all communications are similarly protected. In his report last year Admiral Twining, Chief of the Bureau of Ordnance, said the triple turret, notwithstanding its disadvantages, had been rendered necessary by the great weight of armour that was required. The six boiler compartments are amidships, with one funnel, and the oil fuel is carried chiefly in the double bottom. The secondary armament will consist of twenty-one 5-in. guns. Owing to the economy of boiler weights, and space gained by the single funnel, there is much more deck area, and the guns have larger arcs of fire. Machinery: two high-pressure

and two low-pressure Curtis turbines, 26,500 S.H.P., speed 20·5 knots. The cage or lattice mast is retained for the new ships, a severe test of one of the class, installed in the San Marcos, having proved the comparative immunity from damage by shell fire.

Pennsylvania. The battleship Pennsylvania, which was authorised last year, will be built by the Newport News Company. The following will be her general characteristics:—Length, 600 ft.; breadth, 97 ft.; draught, about 28 ft. 6 in.; displacement, about 31,400 tons; main armament, twelve 14-in. guns, mounted, it is said, in four triple turrets, and a torpedo defence armament of twenty-two 5-in. guns. There will be four submerged torpedo tubes. The vessel will be heavily armoured, and will have oil-burning water-tube boilers. Several types of machinery have been under consideration. The speed is to be 21 knots.

Destroyers. Particulars of the Beale class of destroyers, 900 tons, 1911, and of their successors of the Aylwin class, 1010 tons, have been given in the *Naval Annual*, and will be found in the tables. Six additional boats, which will be named O'Brien, Nicholson, Winslow, McDougal, Cushing, and Ericsson, were provided for last year. They are variants of the previous type, with a little more displacement; Yarrow boilers, Curtis reduction-gear turbines, four 4-in. guns instead of five, and two torpedo-tubes instead of three. This description applies to the Cushing, which is being built by the Fore River Company. In recent trials the Ammen class and others have easily exceeded the contract speed. All the destroyers built by the Cramps have White-Forster boilers and Cramp-Zoelly turbines. Owing to a boiler explosion in the Walke, four officers and men were killed and several severely burned.

Destroyer tender. A tender for destroyers is to be built. Mr. Meyer said in his report that one such auxiliary was required for every sixteen destroyers.

Submarines. Four submarines of the new K class, K5–K8, 500 tons, were authorised in 1911, and under the last Appropriation Act eight additional boats are provided for. These are described as of the coast-defence class, though some of them possess considerable range of action. The Fore River Company have nine boats in hand, and are building the Niagara, a submarine tender, of 900 H.P. and 12¼ knots, which will have Diesel oil engines. G4, a Laurenti submarine, has been launched by the Cramps at Philadelphia.

Fuel ships. The policy of building colliers or oil transports of large capacity is being continued. There are now fourteen in existence, of which one is to be converted into a repair ship, and two more are to be

built, named the Kanawha and Maumee, these being rivers which flow severally through the oil-fields of West Virginia and Ohio.

River gunboat. The river gunboat Monocacy is under construction at the Mare Island Navy Yard.

Aviation. Mr. Meyer regretted in his report that last year a sum of only 20,000 dollars was voted for aeroplane purposes. He reproached Congress for its parsimony in this matter, pointed to what aviators had achieved, spoke about the importance of the service, and asked for more generosity. During the twelve months up to August 31, 1912, four aviator officers, who are instructors, made 593 flights in Curtiss and Wright machines.

Reserve fleets. Mr. Meyer profited by his visit to this country to inquire into the working of the nucleus system for reserve ships, and afterwards he found it possible to create and organise reserve fleets on this system on the Atlantic and Pacific coasts. These fleets, possessing an important military value, are maintained in a state of material readiness, and would in time of war or emergency constitute a second line of defence. The Atlantic Reserve Fleet was established May 1, 1912, and the Pacific Reserve Fleet March 25, 1912, each of them under a Rear-Admiral. The ships of these fleets are in commission with reduced *personnel*, but are ready for sea as regards material, and they are governed by regulations and routine carefully drawn up to keep them in constant readiness for sea. The ships will make a short cruise each year, during which full-power trials and target practice will be held, and will be prepared either to replace ships in the first line or to form a powerful and efficient coast defence. These reserve fleets have been created from what was two years ago a scattered lot of unserviceable and uncommissioned vessels, and without in any way neglecting the actual fleet it has been possible to complete the work on practically every vessel heretofore "in ordinary."

Administration and *personnel*. The late Secretary was not able to achieve all his objects. He succeeded in simplifying and expediting administration, and three years' experience showed the value of the Aids who were appointed to advise him and who constituted a sort of consultative council, but Congress has not yet legalized their positions as he desired. The Council of National Defence, which he advocated, has not yet come into existence. The *Personnel* Bill, which had been revised and brought into proper form, and is regarded as a logical measure dealing with an urgent question, had not been given effect when the new President and Secretary came in. In the year 1912 the commissioned officers numbered 3076 and the enlisted men 51,500, of whom 42,663 were native born.

In relation to the forthcoming opening of the Panama Canal, Mr,

Meyer referred in his report to its naval significance, and the following are some of his remarks :— Panama Canal and naval bases.

It has been erroneously stated that the canal will double the Fleet. It will increase the efficiency of the Fleet somewhat because, if the Fleet is on this side, it will reduce the time necessary to bring it around to the Pacific coast, but it does not increase the number of ships. The canal does double the power of the Fleet in some respects when it permits of transferring the Fleet from one side to the other, but this is a condition that has been fully considered whenever the subject of present and future naval strength has been under discussion by the naval experts. With an immense coastline, and with the whole of South and Central America to separate the east from the west coasts, this country would otherwise need double the Fleet of a country whose coastline is continuous.

The Navy is interested in a dry dock and repairing shops which are intended to be provided at the canal. The main dock will be situated at Balboa on the Pacific side, and will be capable of accommodating any vessel that can pass through the canal locks. It will have a length of 1000 ft., and a width of 110 ft, and will be of the same size as the Pearl Harbour dry dock. The dry dock at Balboa will have a rock foundation and its sides will be lined with concrete. A smaller auxiliary dry dock will also be built there. The large dock has been designed and constructed to meet the requirements of the Navy. The estimated cost is £353,231, while the total cost of the construction of terminals, including wharves, shops, etc., will be £340,696.

The large dry dock at Puget Sound is almost completed, and that at Pearl Island, Hawaii, is well advanced, though great difficulties have been encountered.

MINOR NAVIES.

ARGENTINA.

The two battleships Moreno and Rivadavia, built by the New York Shipbuilding Company and the Fore River Company, are now approaching completion, and will be delivered probably in the summer. They have been fully described in the *Naval Annual.* The Minister of Marine is adding 2000 officers, seamen, and stokers, it is said, for these ships and the destroyers which are in hand. Presumably there exists, however, a large body of trained officers and men who can be drafted from other ships. It requires several years to train officers and men for service in modern battleships and destroyers. The cost of the Navy is about £5,754,000, being an increase of over £198,000.

Of the twelve large and powerful destroyers which have been built, four by Messrs. Cammell Laird (San Luis, Santa Fé, Santiago and Tucuman), four in French Yards and four in German Yards, the

British-built boats were sold by the Argentine Government to Greece in October. The other boats are all completed. They have a normal speed of 32 knots, which has been largely exceeded. The Schichau boats, Cordoba and La Plata, attained maxima of 34·7 knots and 36·8 knots. Four destroyers of a still more powerful type are intended to be built to replace the four sold to Greece. Messrs. Vickers are building a floating dock for destroyers of 1500 tons lifting capacity.

Brazil.

State of the Navy.

The *Relatorio* of the newly appointed Minister of Marine, Rear-Admiral Manoel Ignacio Belfort Vieiro, published last August, was a document notable for its vigorous exposition of the requirements for the new Navy. The first object was to insist on the great necessity of better training and better organisation for officers and men. The new regulations which were introduced by a decree of April 2, 1911, would, in the Minister's opinion, have been conducive to such an excess of theoretical work that the practical side of the seaman's training would have been practically nullified, but the mutinies and troubles of November and December, 1910, had had the consequence of so far reducing the *personnel* that, in order to provide the minimum number of men required for the Squadron, the work of the schools was paralysed and special training took place on board the ships. The Minister explained his ideas with regard to the training of boys for the Navy, embracing moral and professional instruction and the formation of character. The schools, he said, were places where the stones were shaped which were required for the building of the edifice of the national Navy.

On the subject of naval bases and flotillas, the Minister said that the utter unpreparedness of the country in the former matter would in war be a peril threatening her integrity and even her independence.

In the vast territories of the north of the Republic, where the Amazon and the Parà are the great avenues to the coveted riches of the interior, it is necessary to maintain an effective flotilla, and to create a really effective naval base on the Parà, which shall be differently organised from the bases of the south but shall possess resources for the repair and refitting of the Squadron of the ocean. At the present time this yard is in a deplorable state. The flotilla has important duties in exploration, hydrography, and the policing of the rivers, but it has also a purpose in war, and the Minister advocates swift, lightly-armed launches, despatch vessels of the torpedo-boat type, and monitors to deal with the vessels of an enemy.

Three of the latter class are in hand. There are difficulties in regard to the *personnel* owing to the prevalence of malaria.

At the present time there exists but one wireless station, that in the Ilha das Cobras, which imperfectly fulfils its purpose, and the Minister judges it necessary to institute a complete series of stations along the coast. He drew a disquieting picture of the situation of the arsenals from the point of view of modern requirements. A dockyard or port with facilities for the repair of ships must be provided in the province of Santa Catharina. The principal dockyard at Rio de Janeiro is no longer equal to the requirements of the Fleet, and must be provided with new plant and resources. At the present time, for work which should be executed in the yard the administration has to resort to private contractors.

Rio de Janeiro design.

The battleship Rio de Janeiro was launched January 22, 1913. When the Brazilian authorities decided to add another "Dreadnought" battleship to the Navy, constituting, with the Minas Geraes and São Paulo, a division of three on the plan adopted in France, a considerable difference of opinion arose. A proposal was put forward for an armament of twelve 14-in. and fourteen 6-in. guns. Admiral Duarte Huet de Bacellar, chief of the Brazilian Naval Commission, advocated a design in which eight 16-in. guns would have been mounted in four barbettes on the centre line, and six 9·4-in. guns in twin barbettes, two amidships firing on either broadside and two on each beam. Mr. J. R. Perrett, who designed the Minas Geraes and São Paulo, and placed in them an armament designed on a plan which has since been very widely adopted, proposed a design in which the ship would have had ten 15-in. or 16-in. guns in twin barbettes, on the centre line, four firing ahead and four astern, and the whole on either broadside. Ultimately, the Brazilian authorities determined on the retention of the 12-in. calibre, considering that this was justified by the character of the ships likely to be opposed to the Brazilian vessels.

In the plan finally adopted fourteen guns of 12-in. calibre are on the centre line. Two pairs are forward, as in the Minas Geraes, the rear pair firing over the forward pair, and all four have an arc of training of 60 deg. abaft the beam. Aft are two pairs, and immediately forward of them is a barbette with two guns, so that aft there are three barbettes close together, the centre turret having its guns at a higher elevation than the others, the difference being approximately 10 ft. 6 in. The gun positions extend further aft than is usually the case, and all three barbettes are abaft the engine-room, the magazines and shell-rooms being over and alongside the propeller shaft tunnels. Amidships are two turrets, each mounting two 12-in.

guns, with arcs of training of 115 deg. on both port and starboard sides. A considerable space is between the two funnels for these guns, and the superstructure, including the boiler uptakes, is cut away to give the guns the necessary degree of training.

Fourteen of the twenty 6-in. guns are placed in an amidships citadel, with overhead covering of 1½-in. specially hardened steel, which citadel is protected aft by screens of 6-in. armour turned obliquely inward towards the centre line. The other 6-in. guns are mounted on the forecastle level forward, two on each side, behind screens, and two in the superstructure surrounding the after funnel. The ship has four 18-in. torpedo tubes. The following table, taken from *Engineering*, shows the special features of the several designs:—

—	Minas Geraes.	Rio de Janeiro.	Admiral Bacellar.	Mr. Perrett (Alternative).
Length between perpendiculars (feet)	500	637	630	650
Displacement (tons)	19,300	27,500	30,500	31,250
Speed (knots)	21·4	22	23	23
Weight of broadside (including all guns) (lb.)	8995	12,900	21,320	24,380 lb., 16-in. guns; 20,210 lb., 15-in. guns
Armament	12 12-in.	14 12-in.	8 16-in., 6 9·4-in.	10 16-in. or 15-in.
	22 4·7-in.	20 6-in. 10 3-in.	14 6-in., 4 12-pdrs.	14 6-in. 4 12-pdrs.

The following are details of the protection of the new ship:— Water-line, 9 in., 13 ft. 6 in. deep for a length of 356 ft., reducing forward and abaft to 6 in. and then 4 in.; bulkheads, 6 in.; barbettes and gun-hoods, 9 in.; conning and direction towers, 12 in. and 9 in., with 6-in. roof and 8-in. tube; 2-in. decks. There are seventeen main bulkheads and, in all, 365 watertight compartments. The propelling machinery consists of Babcock & Wilcox boilers, twenty-two in number, and Parsons turbines, driving four shafts each with one propeller; 32,000 S.H.P. Coal, normal 1500 tons, maximum 3500 tons; 500 tons of oil in the double bottoms. Speed, 22 knots. Complement, 1100.

Smaller vessels.

Three armoured monitors, Javary, Medeira, and Solimões (1200 tons, 11·5 knots, two 6-in., two 4·7-in. and four 3-pdr.) are being built by Messrs. Vickers.

Three submarines of the Italian Medusa type are being built by the F.I.A.T. San Giorgio Company, Muggiano, Spezia, and the same company is to build a special mother, salvage, docking and testing vessel for submarines.

The protected cruiser Ceara, which was to have been built in this country, is not being proceeded with.

CHILE.

Contracts for both the battleships which were authorised by the National Congress on June 12, 1910, have been placed with Messrs. Armstrong, Whitworth and Company. Provisionally they were known as Valparaiso and Santiago, but have now been named the Almirante Latorre and Almirante Cochrane, respectively after a distinguished officer who, as a captain, captured the Huascar in the war between Chile and Peru, and after the celebrated Admiral Thomas Cochrane, Lord Dundonald, who was in the service of Chile from 1818 until 1823. **New battle-ships.**

The keel of the Almirante Latorre was laid in December, 1911, and she is to be completed next year. The contract for her turbines was given to Messrs. John Brown & Co., Clydebank. The Almirante Cochrane will be built at the new shipyard of the Messrs. Armstrong, Whitworth at Walker, on the Tyne, for delivery early in 1915. The following are the general particulars, completing those which have already been given: Normal displacement, 28,000 tons; length, 625 ft.; beam, 92 ft.; normal draught, 28 ft. 6 in. In the matter of armament the Chilian authorities were not swayed by the considerations which affected the design of the Brazilian battleship. They have adopted the general plan of the King George V. and Orion classes, substituting 14-in. guns for 13·5-in. Armament, ten 14-in. in five turrets on the keel-line (all guns firing on the broadside and four ahead and astern), sixteen 6-in., four 3-in., two 12-pdr. and four machine guns, four submerged 21-in. torpedo tubes. Protection: water line, 9 in., 6 in. (at the ends), and 4 in.; gun positions, 10-in. and 6-in. Krupp cemented and Armstrong steel; deck, 4 in. and 2 in.; four shafts and screws; 37,000 S.H.P.; speed, 23 knots; Yarrow water-tube boilers; Parsons turbines; normal coal supply, 1200 tons, maximum, 4000 tons; oil fuel, 500 tons. Complement 1000.

Two of six large destroyers which Messrs. J. S. White & Co. are building at Cowes have been launched—the Almirante Lynch, on September 28, 1912, and the Almirante Condell, on January 27, 1913. The others are named after Admirals Simpson, Goñi, Williams Robolledo, and Riveros. With the exception of the Swift, these are the largest destroyers afloat. They are fitted with Parsons turbines and White-Forster boilers, consuming coal or oil fuel. The following **De-stroyers.**

are their characteristics compared with those of the Swift and the Daring class:—

—	Chilian Class.	Swift.	Daring.
Displacement (tons)	1500	1800	945
Length (feet)	320	345	260
Beam (feet)	32·6	34·2	27
Draught (feet)	11·1	10·5	—
Horse-power	30,000	30,000	30,000
Speed	31	35·25	31
Fuel (tons)	507	180	200
Complement	160	150	110
Guns	6 4-in. 4 M.	4 4-in.	3 4-in.
Torpedo Tubes	3	2	2

Two submarines, Antofagasta and Iquique, have been ordered from the Electric Boat Company, New York.

China.

Under the *régime* of the Republic, the Ministry of Marine has been reorganized in six chief departments: central administration; *personnel*; a department for stores, provisions, medical service and general affairs; construction and armaments; finance, etc.; education.

The Navy generally supported the new Government, but an atmosphere of politics invaded the Service, and stringent orders were issued, and a strong effort has been made to check the ferment that resulted.

The cruiser Fei-Hung, constructed by the New York Shipbuilding Company, at Camden, New Jersey, was launched May 4, 1912. She is a protected vessel, intended mainly for the training of officers and men, and displaces 2600 tons. Her speed is 22 knots. Armament, two 6-in., four 4-in., two 12-pdrs., six 3-pdrs., and two smaller guns, and she will have two tubes for 18-in. torpedoes. Her complement will consist of 232 officers and men. She is a sister ship of the Ying-Swei and Cha-Hao, which were built respectively at Barrow and Elswick.

Several destroyers of 400 tons and 6000 H.P. are built and building. The Luang-Tuan, 30 knots, two 12-pdr., two 3-pdr., two 18-in. torpedo tubes, was launched at Trieste in 1912. At full-load displacement her mean speed was 30·75 knots. Three destroyers of the same class were launched by Schichau.

Colombia.

Messrs. Yarrow have delivered two motor gunboats, petrol driven, and are completing a third. They are the first vessels of the class.

Length, 80 ft.; beam, 12 ft. 6 in.; depth, 5 ft. 8 in.; draught, 3 ft. 6 in. The only armament is a 3-pdr. gun, mounted forward, but large storage is provided for rifle ammunition. The machinery consists of two Yarrow-Napier four-cycle petrol engines, each of 60 H.P., and the range at 12 knots is 2400 miles.

Denmark.

The coast-defence vessel which was provided for in 1911 has been put in hand. Displacement, 3675 tons; 5,400 H.P.; 16 knots; two 9·4-in., four 5·9-in., and smaller guns. Three torpedo-boats, 250 tons, are being built at Copenhagen, for which MM. Normand, of Havre, have delivered the turbines, as well as three submarines, which are being constructed under the direction of the Whitehead Company of Fiume.

Greece.

The war in Eastern Europe, in which the Greeks have borne a distinguished part, has exercised a very rousing influence upon the Navy, and a considerable expansion is sure to follow. The armoured cruiser Giorgios Averoff, which was the only really powerful unit of the Fleet, was built by the Orlando firm of Leghorn, but the battle-cruiser Salamis, which is the great feature of the new programme, is to be constructed by the Vulcan Company at Stettin. The contract was signed in August, and the ship is to be delivered within two years. Displacement, 19,000 tons. Armament, eight 14-in. guns in four barbettes on the middle line, with twelve 6-in. guns in casemates, and twelve 12-pdrs. The guns and armour (the latter with a maximum thickness of about 10 in.) are to be provided by the Bethlehem Steel Company, of South Bethlehem, Pennsylvania. The main machinery will consist of three turbines with an aggregate of 40,000 H.P., designed for a speed of 23 knots. The total cost will be about £1,240,000.

The Greek Government took over by agreement the four fine destroyers which Messrs. Cammell Laird & Co. had built at Birkenhead for the Argentine Republic, and they are now named Aetos, Leon, Pardalos, and Jerex. They are 285 ft. long, with 27 ft. 7 in. beam, and 9 ft. draught in trial conditions when carrying a load of 195 tons, the displacement being about 1050 tons. The mean speed for six hours' steaming was 32·2 knots, the contract being 32 knots. The equipment of these destroyers and their general design is in advance of the British practice for this class of vessel, and considerable ingenuity was required to meet the exacting conditions demanded by the Argentine Naval Commission. While undergoing trials, these

destroyers were exposed to all conditions of weather, and proved themselves to be excellent sea boats in every respect.

Two large destroyers, now named Keravnos and Neagenea, were bought from the Vulcan yard, Stettin. They are of the late German types, and displace 750 tons, with 32·5 knots speed, four 3·4-in. guns, and two torpedo tubes. The same company is building six torpedo boats of 125 tons and 25 knots.

The submarine Xiphias, sister of the Delphin, has been launched and completed at Chalon-sur-Saône, by Messrs. Schneider. Length, 164 ft.; displacement, 300–460 tons; speed, 14·9 knots; two petrol motors for surface propulsion, and two electric motors for navigation below. The boat has five torpedo tubes. The trials were a complete success.

Netherlands.

The armoured vessel of 7600 tons which was in the programme of 1912 is not to be proceeded with, the class of vessel being considered now out of date.

There are under construction four 30-knot destroyers of 480 tons for service in the Dutch Indies, four 25-knot sea-going torpedo-boats of 180 tons for coast service in Home waters, three 16-knot gunboats of 540 tons (Brinio, Friso and Gruno), provided with Diesel motors, two 11-knot submarines of 150 tons, of the type now in service, and one 350-ton submarine with a surface speed of 16 knots, for service in the Dutch Indies.

In addition to these, the Budget of 1913 includes provision for eight 200-ton torpedo-boats of 26 knots speed, two submarines of 200 tons submerged and 26 knots on the surface, and two submarines of 350 tons submerged and 16 knots, for service in the Dutch Indies.

The floating dock of 14,000 tons for the Surabaya Dockyard, Java, is almost completed. It has been constructed at Amsterdam.

Further fortification of Flushing is intended, this project having received the approval of the Government. The works are to begin in 1913.

The *personnel* of the Navy is to be increased to 11,164.

Norway.

The Storthing rejected the long range programme, but in July last provided for two coast-defence armoured vessels, and the order has been placed with Messrs. Armstrong. With a displacement of 3400 tons, they will carry two 9·4-in. guns, four 6-in., and a number of smaller weapons, together with two 18-in. torpedo tubes. The engines are to be constructed by Messrs. Hawthorn, Leslie and

Company, to give a speed of 16·5 knots. The protection will consist of a water-line belt 7½ in. thick, and the usual thin protective deck. Provision was also made for a submarine, which is being built at the Germania Yard, Kiel, where three other boats, ordered in 1911, are completing.

The Government is preparing a new shipbuilding programme which will include six armoured cruisers, six destroyers, forty torpedo-boats, and twelve submarines.

The *personnel* numbered in 1912 1003, of whom 710 were conscripts.

Fortifications are to be erected on the Christiania fiord and at Bergen, Christiansand and Drontheim.

Peru.

The Commandante Aguirre (ex-Dupuy de Lôme) after being purchased from the French, remained at Lorient where MM. Schneider have effected some changes to her armament. The destroyer Teniente Rodriguez, 500 tons, which has been built by the Schneider firm at Creusot, has left for Peru, and a submarine boat, the Ferré, 300–400 tons, has been sent out in the special transport Kangouroo. A second boat, the Palacios, has been under trial at Toulon. A naval school was opened in Callao Bay in September. The Service is directed by French officers.

Portugal.

The Fleet Law of the Republic contemplated a large programme, but the financial provision was not there, and the programme has for the present shrunk to modest proportions. Originally it included three battleships of 21,500 tons, two cruisers of 2500 tons, torpedo-boats and submarines, which were to cost £8,800,000. As revised, the programme now includes the two cruisers, three submarines of 300 tons, six destroyers of from 700 to 800 tons, and one salvage ship of 800 tons for submarines. Money has been provided for these vessels. The submarine Espadarte, built by the F.I.A.T. San Giorgio Company, is under trial at Muggiano.

Roumania.

The programme includes eight Danube monitors of 600 tons, and it has been decided that four of them shall be built—two in this country, probably by Messrs. Yarrow and Thornycroft, and two in Germany, by Schichau, for delivery in 1914. They will be armed with three 6-in. or 4·7-in. guns, three 4·7-in. howitzers, and six

machine guns. The armour will be 3½ in. thick on the belt and turrets, and there will be a 2½-in. armoured deck. The speed is to be 15 knots in still water, with 2000 H.P.

Spain.

The vessels of the Spanish programme are making slow but steady progress. The España, which was launched last year, should soon be ready for trials, and may be completed in October. The Alfonso XIII, laid down at Ferrol, February 23, 1910, is about to be launched. The third ship, Jaime I, is making progress in the berth from which the España was launched. The Recalde gunboat passed successfully through her trials and was placed in commission, with a complement of 120. Three others of the class are in hand. A further programme is under discussion, which includes three battleships or battle-cruisers of 21,000 tons, two cruisers of 5000 or 6000 tons, nine destroyers, and three submarines. The *personnel* numbered in 1912 665 officers and 9500 men.

Sweden.

The attitude of the Swedish Government and its Naval Ministers has aroused strong public opinion against the policy of retrenchment. The decision in 1911 to buy some torpedo and submarine boats instead of an armoured vessel of 6800 tons, as had been intended, was the cause of severe comment, and the outcome of an agitation was a great national subscription by which a total of about £900,000 was promptly raised, of which a sum of £725,000 is to be applied to the building of the armoured vessel abandoned by the Naval Minister. The name of Sverige has been selected, and the vessel is being built at the Göta Works, Stockholm. The displacement will be 7100 tons, and the speed, with turbines of 20,000 H.P., 22·5 knots. The armament will be four 11-in. 45-calibre guns, eight 6-in., and six 12-pdr., with two tubes for 21-in. torpedoes. The protection of the water-line and turrets will be 8½ in., with side plating of 4 in.

Two Laurenti type submarines, similar to the Italian class, are on the stocks at Malmö.

In 1912 the *personnel* numbered 5715.

In the Estimates of 1913 was a sum of £335,000 for the beginning of two additional coast-defence vessels and a destroyer, but the Minister reduced it to £140,000, and instead intends to build two submarines instead of one. His action aroused great opposition.

TURKEY.

The Ottoman Navy lost, in the war with Italy, the old armour-clad Avn-Illah, the gunboat Seddul Bahr, and four torpedo-boats, and in that with the Balkan States the obsolete coast-defence ship Feth-i-Bulend and the torpedo-boat Antalia.

The two battleships, 23,000 tons, for which orders were placed with Messrs. Vickers and Messrs. Armstrong, were described in the *Naval Annual* last year. The Reshad V., which was laid down at Barrow at the end of 1911, and was to be completed next year, had been built well up to the protective deck, and considerable progress had been made with the turbine engines and auxiliary machinery, when it was decided to stop work pending further developments. The other ship was the Reshad-i-Hamiss, but she was in an earlier stage.

Seven gunboats of 500 tons and 14 knots were building in France, four at Saint Nazaire, and three at La Seyne, of which some are in the water.

On December 4th, the mine-layer Nusrat, 380 tons, 15 knots, was launched at the Germania Yard, Kiel. She is fitted also to serve as a tug.

The cruiser Derna, which was building at Genoa, was taken over by the Italians and renamed Libia.

URUGUAY.

The cruiser Montevideo, ex-Dogali, bought from the Italian Government, became a total wreck on the coast of Rio Grande, November 12th, when on her way to Rio de Janeiro to represent the Uruguayan Government at the anniversary celebration of the proclamation of the Brazilian Republic. The crew were saved.

VENEZUELA.

The United States gunboat Isla de Cuba, which was captured from the Spaniards at Manila, and used as a drill ship, has been purchased, and renamed Maresa Sucre.

JOHN LEYLAND.

CHAPTER III.

Comparative Strength.

The further concentration of British naval strength in Home waters and that of the whole of the French battleships in the Mediterranean are the outstanding features of the year under review. The Mediterranean Battle Squadron has ceased to exist, though its place has been taken (temporarily) by the Third Squadron of the First Home Fleet.

For the British Navy four battleships (including the Centurion, which is to be commissioned in April) and three battle-cruisers (including the New Zealand) have been completed. The Centurion has been delayed as the result of a collision, the Ajax and Audacious by labour difficulties. For the German Navy three battleships and one battle-cruiser have been completed according to programme and two battleships have been launched. The Austrians have completed the Viribus Unitis in a little over two years—a most creditable performance—and launched two other battleships of the same type. Italy has completed the Dante Alighieri, after considerable delay, and should commission two other battleships in September. No battleship has been completed for the French or Russian Navy, though both have a large programme of construction in hand, which will begin to tell before the close of next year. The United States and Japan have each completed two battleships. It is evident from the above summary that Germany has improved her position during 1912–13 relatively to other Naval Powers.

Fleets in commission.

Britain.

In the table on the following page are given the Fleets in commission in the waters of Northern Europe. Under Great Britain are included all the squadrons of the First and Second Home Fleets, though the Third Squadron is serving temporarily in the Mediterranean. The First and Fourth Squadrons are one battleship and the Third Squadron two battleships short of the proposed strength. These deficiencies will be made good before the end of the year. The Sixth Battle Squadron has not yet been formed. The First Battle Squadron is homogeneous, consisting of earlier Dreadnoughts, carrying 12-in. guns; but for the delay in the completion of the Centurion, Ajax and Audacious, the Second Squadron, consisting of Dreadnoughts carrying 13·5-in. guns, would also have been homogeneous ere this. The Third Squadron is homogeneous, consisting

CLASS.	GREAT BRITAIN.			GERMANY.		RUSSIA.
	HOME FLEETS (NEPTUNE C.-in-C.)			FRIEDRICH DER GROSSE (Fleet Flagship).		
	FIRST FLEET.		SECOND FLEET.			
BATTLESHIPS . .	*1st Squadron.* Collingwood St. Vincent Colossus Vanguard Bellerophon Superb Temeraire Hercules*	*3rd Squadron.* King Edward VII. Hibernia Britannia Commonwealth Dominion Zealandia	*5th Squadron.* Queen Prince of Wales Bulwark Formidable Implacable Irresistible London Venerable	*1st Squadron.* Ostfriesland Thüringen Helgoland Oldenburg Nassau Rheinland Posen Westfalen	*3rd Squadron.* Kaiser Elsass Braunschweig	Andrei Pervozvannyi Imp. Pavel Cesarevitch Slava
	2nd Squadron. King George V. Orion Conqueror Monarch Thunderer Centurion Agamemnon Lord Nelson	*4th Squadron.* Dreadnought Africa† Hindustan† Albemarle Cornwallis Duncan Russell	*6th Squadron.* Vengeance.	*2nd Squadron.* Preussen Schleswig Holstein Pommern Hannover Hessen Schlesien Lothringen Deutschland	*Reserve.* Wittelsbach Zahringen Mecklenburg Wettin	
ARMOURED CRUISERS . .	*1st Squadron.*‡ Lion Princess Royal Indefatigable Invincible Indomitable†	*3rd Squadron.* Antrim Argyll Devonshire Roxburgh	*5th Squadron.* Carnarvon Lancaster	Moltke Goeben Von der Tann Yorck		Gromoboi Bayan Makaroff Pallada
	2nd Squadron. Shannon Achilles Cochrane Natal Warrior	*4th Squadron.* Suffolk Berwick Donegal	*6th Squadron.* Drake Good Hope King Alfred Leviathan			
LIGHT CRUISERS .	4	4		8		

* In Second Squadron, April 1st. † Temporarily. ‡ 1st Battle Cruiser Squadron.

entirely of vessels of the King Edward VII. class. The Fourth Battle Squadron is, at the time of writing, in a transition stage. Each of these Battle Squadrons has its attendant Cruiser Squadron. The First Squadron is composed of battle-cruisers. The Indomitable, Indefatigable, and Invincible are to be transferred to the Mediterranean. The First Battle Cruiser Squadron will, later in the year, comprise the Queen Mary and New Zealand, in addition to the Lion and Princess Royal. Attached to each of the four squadrons of the First Fleet is a destroyer flotilla, comprising from fifteen to twenty destroyers, with parent and depôt ship.

The Second Fleet is to consist of two Battle Squadrons, with their attendant Cruiser Squadrons. Only one of these Battle Squadrons has so far been formed. Half the crews, including a large proportion of special ratings, are always on board, the other half being in school or barracks. At the Lord Mayor's banquet on November 9th last year the First Lord stated that recruiting for the Navy had been so satisfactory that the Sixth Battle Squadron would be similarly manned with active service rating during this year instead of in 1916, as had been originally intended. This squadron at present consists of only one ship, the Vengeance, which is engaged as a gunnery training ship at Sheerness. No destroyer flotilla is attached to the Second Fleet, but it includes a Mine-Layer Squadron.

The Third Fleet, which is not included in the list, is manned with nucleus crews. It comprises the Seventh Battle Squadron (eight Majestics) and the Eighth Battle Squadron (five Canopus class and the Jupiter), and six Cruiser Squadrons, made up of the older cruisers (Cressys, Diadems, Edgars, etc.). Four patrol flotillas have been organised under the newly created Admiral of Patrols, three consisting of from twenty-one to twenty-five destroyers and the fourth of torpedo-boats.

Under the Amendment to the Navy Law* adopted last year, the German Active Fleet will comprise three Battle Squadrons of eight battleships instead of two squadrons as hitherto. There will thus be twenty-five battleships (including the Fleet flagship) in full commission instead of seventeen.

Germany. The First German Battle Squadron is now wholly composed of all-big-gun ships. The Second Squadron is composed of eight battleships of the Deutschland and Braunschweig classes. The recently completed Friedrich der Grosse has taken the place of the Deutschland as Fleet flagship. The new Third Squadron, of which so much has been made during the year, is in an early stage of formation. On January 1st it included only three battleships, *viz.*, the newly

* A translation of this Amendment is given in Part IV.

completed Kaiser and two Braunschweigs. The completion of the König Albert, Prinzregent Luitpold, and Kaiserin during the current year will bring the Third Squadron nearly up to full strength. The Cruiser Squadron will comprise four battle-cruisers (when the Seydlitz relieves the Yorck) and eight small cruisers.

A comparison of the Fleets maintained in full commission by Great Britain and Germany in the waters of Northern Europe does not give much ground for the alarm which has been expressed in certain quarters. The British and German First Squadrons may be taken as of equal strength. The British Second Squadron is far more powerful than the German Second Squadron. The King Edwards of the British Third Squadron are more powerful than the Braunschweigs or Deutschlands, of which the German Second Squadron is composed, while any ship in the British Fourth and Fifth Squadrons is fit to "lie in a line" against them. Turning to the older ships in Reserve, the Majestics with their 12-in. guns are more powerful than the Wettin and Kaiser classes with their main armament of 9·4-in. guns. These considerations lead to the conclusion that the despatch of the Third Squadron to the Mediterranean has not seriously endangered our security in Home waters.

The Russian Baltic Fleet comprises the same ships as last year. It is not at present a very formidable force, but when the battleships launched in 1911, and which are not progressing very rapidly, are completed it will become a Fleet which must be taken into serious consideration.

The French have only three armoured cruisers of the Condé type in full commission and three others in partial commission, based on Brest, and designated the First Light Squadron. The Second Light Squadron comprises twenty-four torpedo-boats.

The Mediterranean. France.

The ships in commission in the Mediterranean are given in the table on next page. As already mentioned, the French have concentrated practically their whole fighting strength in the Mediterranean, even the older battleships having been transferred there. The First Battle Fleet (1ere. Armée Navale as it is now called) comprises the First and Second Squadrons, which consist of the same ships as last year. The Courbet and Jean Bart should be completed this year and will strengthen the First Squadron. A Third Squadron of six ships has been formed and is to be based on Toulon or Bizerta. This Squadron is manned with nucleus crews. The Cruiser Squadron comprises the six most powerful armoured cruisers of the French Navy. Thirty-eight destroyers are attached to the First Battle Fleet. The policy of France in concentrating practically her whole naval strength in the Mediterranean is fully discussed by Mr. Leyland in the previous

chapter. Though generally approved by French opinion, it has some powerful critics.

MEDITERRANEAN.

	Britain.	*France.*	*Italy.*	*Austria.*
	3RD SQUADRON.	1ST SQUADRON.	1ST SQUADRON.	Viribus Unitis
	Home Fleet (tempy.)	Voltaire	Dante Alighieri	(Fleet Flagship.)
		Condorcet	Regina Elena	
BATTLESHIPS	Edward VII.	Danton	Roma	1ST SQUADRON.
	Hibernia	Mirabeau	Napoli	Erz. F. Ferdinand
	Britannia	Diderot		Radetzky
	Commonwealth	Vergniaud		Zrinyi
	Dominion			
	Zealandia	2ND SQUADRON.	2ND SQUADRON.	
		Patrie	Benedetto Brin	RESERVE.
		République	Reg. Margherita	Erz. Karl
		Justice	Filiberto	Erz. Friedrich
		Vérité	St. Bon	Erz. Ferd. Max
		Démocratie		
		Suffren		
		3RD SQUADRON.		
		St. Louis		
		Gaulois		
		Carnot		
		Masséna		
		Bouvet		
		Jauréguiberry		
ARMOURED CRUISERS	Inflexible*	Waldeck Rousseau	Amalfi	St. Georg
	Defence		Pisa	
	Black Prince	Edgar Quinet	San Marco	
	Duke of Edinburgh	Ernest Renan	Garibaldi	
		Léon Gambetta	Varese	
		Jules Ferry	Ferrucio	
		Victor Hugo		
LIGHT CRUISERS	4	1		

Italy. The Italian Fleet in commission comprises the same number of battleships and armoured cruisers as last year. The First Squadron includes the Dante Alighieri and three battleships of the Regina Elena class, and three armoured cruisers of the Pisa type.† The Second Squadron is composed of four battleships and three smaller armoured cruisers of the Garibaldi type. The Cavour will, according to the Report on the Estimates, not be completed till 1914. Her two sister ships will probably be completed in September next, so that the Italian First Squadron will not be composed entirely of all-big-gun ships till next year.

Austria. The Viribus Unitis has been added to the Austrian Fleet in commission as Fleet flagship. The First (Active) Squadron includes, as last year, the three battleships of the Radetzky type. The Reserve Squadron comprises three small battleships of 10,400 tons displacement. The Austrian Navy is very deficient in cruisers, and little effort is being made to remedy the deficiency. Only

* Battle-cruiser.

† Besides one in reserve.

one small armoured cruiser and a scout are in full commission; only three scouts are under construction.

Six battleships of the Third Squadron of the Home Fleet have been stationed in the Mediterranean during the winter months. The Mediterranean Fleet will in future comprise a Battle-cruiser (the Second) Squadron consisting of four ships of the Indomitable class and a squadron of four armoured cruisers. The Inflexible is already on the station. The narrow waters of the Mediterranean do not seem the most suitable sphere of action for vessels with the sea-keeping qualities of our battle-cruisers. **Britain.**

The position in the Mediterranean has been profoundly modified during the past year by the withdrawal of the British Battle Squadron and the concentration of the French Navy in these waters. The British Squadron must either have been withdrawn or considerably strengthened. It was useless to leave there six ships* less powerful individually than any battleship in the French First or Second Squadron (with the exception of the Suffren), or in the Austrian First Squadron, to say nothing of the all-big-gun ships Dante Alighieri and Viribus Unitis, which have recently been added to the respective fleets. The King Edwards, which have upheld British prestige in the Mediterranean for the past winter, are fit to "lie in a line" with any French, Austrian or Italian battleship except the two last named. During the current year two Cavours and the Tegetthoff will probably be completed. The Italians will then have three and the Austrians two all-big-gun ships in commission. The British Mediterranean Squadron will require the addition of at least four Dreadnoughts during the current year to uphold British prestige in the Mediterranean. Can they be spared from Home waters? We have eighteen† and Germany has ten Dreadnoughts completed. Considering our large superiority in pre-Dreadnought ships a margin of four Dreadnoughts in Home waters should be sufficient in the event of a sudden attack by Germany.

The present writer does not believe in the probability of such an attack being made, and he would urge on his fellow countrymen to consider the growth of the German Navy from the point of view of a patriotic German. A few years ago the German Navy was a negligible quantity, and we were consequently in a position to ignore Germany's views in any international question. From the German point of view the situation of Germany *vis-à-vis* to Great Britain was intolerable. Germans in responsible positions, and notably H.M. the Emperor himself, have repeatedly declared that Germany needed a powerful navy to ensure that her views and **The German menace.**

* Duncans and Swiftsure. † Including Lord Nelsons.

interests should be respected on any question of *Welt-politik*. Their declarations may be accepted in England as a true statement of German policy, in the same way as the plain speaking of the First Lord of the Admiralty on the vital importance of sea-power to this country is beginning to be appreciated in Germany. It is highly improbable that we shall be involved in a single-handed contest with Germany. In any case the probability of German aggression is not sufficient to prevent us from keeping an effective battle squadron in the Mediterranean, or at any rate one based on Gibraltar, available, like the Atlantic Fleet was, for service on either side of the Straits.

Atlantic. United States.

The United States Atlantic Fleet is organised, as last year, into four divisions of five ships each, with a Fleet flagship (the Wyoming has relieved the Connecticut) as follows:

Wyoming (Fleet Flagship).

1st Division.	2nd Division.	3rd Division.	4th Division.
Utah.	Vermont.	Virginia.	Minnesota.
Arkansas.	Louisiana.	Georgia.	Connecticut.
Florida.	Michigan.	Nebraska.	Idaho.
Delaware.	New Hampshire.	New Jersey.	Kansas.
North Dakota.	South Carolina.	Rhode Island.	Ohio.

Ten ships from the first three divisions with the Fleet flagship had their headquarters at Guatanamo Bay, Cuba, during the winter months. The remaining ships of these three divisions and the whole of the ships in the fourth division were distributed at various yards. The Atlantic Fleet is without cruisers, but there is attached to it a torpedo flotilla, comprising five groups of destroyers (five to each group) and two groups of submarines. Eleven older battleships are in reserve.

The South American Republics.

The fact that the three principal South American Republics have recently commenced to build battleships as powerful as any in the world should be noted in considering the situation in the South Atlantic. Brazil has two battleships completed, each carrying twelve 12-in. guns, and the Rio de Janeiro, of 27,000 tons displacement and carrying fourteen 12-in. guns, under construction. Argentina has two battleships of 27,600 tons completing in the United States. Chile has recently ordered two battleships of 28,000 tons displacement and to carry ten 14-in. guns.

Britain.

In the Western Atlantic we have only three small cruisers, the Æolus, Melpomene, and Sirius, and on the South-East coast of America the more modern Glasgow, of 4800 tons displacement. In view of the approaching completion of the Panama Canal, and the large volume of British trade which may be expected to pass through it, the value of the West Indies to a Power which aspires to the command of the sea is increasing. We have vast commercial interests in South

America. The British Flag is not adequately represented in the Western Atlantic at present. One of our Cruiser Squadrons should be sent to the West Indies and to South America every winter—which would be infinitely better for their crews than keeping the ships tied to Home ports. A Cruiser Squadron might well pay an annual visit to Newfoundland and Canadian Atlantic ports.

The Cape Squadron has been further reduced from three cruisers to the Hyacinth, which has replaced her sister ship the Hermes, and the Forte, one of the Naval Defence Act cruisers. Cape.

The Japanese Fleet in commission is organised as follows :— Eastern waters.

1st Squadron.—Battleships Kawachi, Katori, Aki, Mikasa, Shikishima; armoured cruiser Ibuki.

2nd Squadron.—Armoured cruisers Tokiwa, Iwati, and two smaller cruisers.

3rd Squadron.—Four third-class cruisers and two gunboats.

Training Squadron.—Armoured cruiser Adzuma and one smaller cruiser.

The following is a list of the ships kept in commission by other principal Naval Powers in Eastern waters :—

	Great Britain.	*Germany.*	*France.*	*United States.*
Armoured Cruisers	Minotaur.	Gneisenau.	Montcalm.	Saratoga.
	Hampshire.	Scharnhorst	Dupleix.	
	Kent.		Kleber.	
	Monmouth.			
Light Cruisers	Newcastle.	Leipzig.		Albany.
	Flora.	Emden.		Cincinnati.
	Highflyer (E.I.)*	Nürnberg.		
	Fox (E.I.)			
	Pelorus (E.I.)			
	Perseus (E.I.)			
	Philomel (E.I.)			
	Cambrian (A.)			
	Psyche (A.)			
	Pyramus (A.)			
	Melbourne (R.A.N.)			

E.I. = East Indies. A. = Australia. R.A.N. = Royal Australian Navy.

The German and United States Squadrons are practically the same as a year ago. To the French Squadron the Montcalm has been added. The British China Squadron has been weakened by the transfer of the Defence to the Mediterranean and the substitution of the Hampshire.† The Australian Squadron of the British Navy is rapidly disappearing. The Drake, the Challenger, and one small cruiser have been withdrawn. The Encounter has been lent, and the Pioneer presented, to the Australian Navy. The dockyard in Sydney will be transferred to the Commonwealth on July 1st. The first unit of the Royal Australian Navy—the Melbourne—has arrived in Australia; the battle-cruiser Australia will leave in June with Rear-Admiral Patey, who is to command the unit; the Sydney will shortly be completed. The battle-cruiser New Zealand, presented by the Dominion to the British Navy, left in February,

* To be relieved by Swiftsure. † Triumph is to be added.

viâ the Cape, for a three months' visit to New Zealand waters, after which she is to return for service in the Home Fleets, instead of becoming the flagship of the China Squadron. The proposed organisation of the Eastern Fleet with its three units in the East Indies, Australia, and China, each with a battle-cruiser as flagship, is thus very far from being realized. By the end of the current year it will only comprise one battle-cruiser instead of three, as intended.

Pacific. The United States Pacific Fleet comprises four armoured cruisers—Colorado (flagship), California, Maryland, and South Dakota—and a torpedo flotilla in the first division, and four armoured cruisers and the battleship Oregon in reserve. On the West Coast of America and in the Eastern Pacific the British Navy is represented by two sloops and the cruiser Rainbow, which has been bought by the Canadian Government for training purposes.

A Dominion Squadron. The foregoing review of the ships in commission on extra European stations shows that there has been a further weakening of the British Squadrons during the past year. The British flag is not adequately represented on many stations where we have enormous interests. The policy of concentration has been carried too far. The First Lord's announcement that it is proposed to form the ships built or to be built by the Oversea Dominions for the British Navy into a squadron, which, though based on Gibraltar, shall from time to time visit Canadian, South African, Australian or Eastern ports, cannot be too highly commended. Nothing could better conduce to making the inhabitants of our outlying Dominions realise the importance of an Imperial Navy. From this point of view, the less time this proposed squadron spends in European waters the better, and it would be even more desirable that it should be based on Hong Kong and Sydney.

Comparative Tables. The Comparative Tables have been largely remodelled. The Austrian Navy has been inserted in place of that of Japan. Space prevents both being included, and for those who make comparisons of Naval strength, particulars of the Austrian Navy will be more useful. All the pre-Dreadnought battleships have been transferred to Table III., with the exception of the two Agamemnons, the six Dantons and the two Russian battleships—which may be considered fit to lie in a line with Dreadnoughts. In the cruiser tables the second and third class cruisers, which are for the most part covered by the official designation of "Light Cruisers," have been put together in one table, with a space to indicate the line of division between the two classes as hitherto classified. The classification of cruisers adopted in the tables does not agree with the somewhat complicated arrangement of the Dickinson return recently issued.

The present position as regards battleships of all classes, including battle-cruisers, is shown in the following table:

	Britain.	Germany.	Austria.	Italy.	France.	Russia.	U.S.	Japan.
Built . .	63	33	10	9	21	10	33	15
Building .	14	13	3	7	11	11	5	5
Total .	77	46	13	16	32	21	38	20

Of completed battleships we have nearly the same number as Germany and the United States combined, but our superiority largely consists in pre-Dreadnoughts. We have sixty-three battleships to fifty-two of the Triple Alliance, and to thirty-one possessed by France and Russia. The British and German Navies (more especially the latter) have both improved their position relatively to other navies during the past year. The present commanding position of the British Navy will not be so well maintained in the near future when our numerous older battleships are struck off the list.

A forecast of the position as regards modern battleships—including in this category the two Lord Nelsons, the six French Dantons, the two Russian Imperator Pavel I. type, and the Japanese Aki and Satsuma, as well as the battleships and battle-cruisers carrying eight or more guns of 11-in. calibre and over—at the end of 1913 and two following years is given in the table below. Modern battle-ships.

	Britain.	Germany.	Austria.	Italy.	France.	Russia.	U.S.	Japan.
1913 (end)	29	17	2	3	8	2	8	5
1914 (to be completed) .	5	3	1	1	2	4	2	1
1914 (end)	34	20	3	4	10	6	10	6
1915 (to be completed) .	7	3	1	4	3	3	2	3
1915 (end)	41	23	4	8	13	9	12	9

The above table is based on the completion for the British Navy of the following ships—in 1913, battleships Ajax and Audacious, battle-cruisers Australia and Queen Mary; in 1914, battleships Iron Duke, Marlborough, Delhi and Benbow, battle-cruiser Tiger; in 1915, battleships Barham, Queen Elizabeth, Valiant, Warspite, Malaya, and two of the battleships provided for in the Navy Estimates of 1913–14, which are to be laid down this summer. Should the three battleships which the Canadian Government propose to present to the British Navy be also laid down this summer, they will probably be completed in 1915, and an addition of three ships must be made to the British total at the end of 1915. For the German Navy, it is estimated that three battleships or battle-cruisers will be completed each year. For the Austrian Navy, the Tegetthoff

will be completed in 1913, the Prins Eugen in 1914, and the ship designated No. VII. in 1915. Having regard to the rapidity with which the Viribus Unitis was constructed, it is just possible that the Prinz Eugen may be completed in 1913, and No. VII. in 1914. For the Italian Navy, two battleships will be completed during the current year; but unless there is a great improvement in the Italian rate of construction, only one battleship will be completed in 1914, and the Doria and Duilio will not be ready for sea till 1915. The Dandolo and Morosini are down for completion in the summer of 1915, but it is doubtful whether this anticipation will be realised. For the French Navy, the Courbet and Jean Bart, launched in 1911, should be completed this year; the France and Paris in 1914, and the Bretagne, Lorraine, and Provence in 1915. Owing to the determination of the Russian Naval authorities to depend on national resources, the rate of construction is slow. The four battleships building in the Baltic Yards, which were launched in 1911, should be completed in 1914; the three battleships laid down in the Black Sea, and not yet launched, may be completed in 1915. The United States will complete two battleships in 1914 and two in 1915. For the Japanese Navy, the battle-cruiser Kongo will be completed this summer, another battle-cruiser in 1914, the battleship Fuso and two battle-cruisers in 1915.

The position end of 1915.

The outlook for the British Navy, as shown in the table on p. 85, is not unfavourable. At the end of 1915 we shall have ready for service forty-one—and may have forty-four—all-big-gun ships to twenty-three possessed by Germany, and thirty-five by the Triple Alliance. The Franco-Russian combination will at the same date possess twenty-two ships, and will in modern ships be almost equal to the German Navy alone. The strength of the French Navy will in 1915 be greater than that of Italy and Austria combined. In 1916 four battleships should be completed for the French Navy alone to three for Germany. It is evident, therefore, that in the immediate future the Franco-Russian combination will be a serious factor in preserving the balance of power in Europe. Our programme of new construction for 1913–14 provides for the commencement of five battleships, to which must be added, if Mr. Borden's proposals are approved by the Dominion Parliament, the three battleships to be built by Canada.

Position in 1916.

The First Lord, in his speech on March 26th in the House of Commons, stated that super-Dreadnoughts (*viz.*, ships carrying as main armament guns of 13·5-in. or larger calibre) were as much superior to the Dreadnoughts as the Dreadnoughts are to ships of earlier date, and that in 1920 the British Navy would possess

forty-one and Germany twenty-four ships of this class. This estimate is based on the German programme of new construction, set forth in the amended Navy Law, being adhered to, and on four ships being laid down for the British Navy in 1915 and following years. Ships built by the Oversea Dominions are not included.

Cruisers. In the cruiser classes we have a great superiority. Of armoured or first-class cruisers we have forty-two (including the eight protected cruisers of the Diadem type), Germany nine, Austria one, Italy seven, France eighteen, Russia six, the United States fifteen, and Japan thirteen. France, the United States, and Japan stand well in ships of this class. No power is building armoured cruisers.

The total figures as regards light cruisers are given in the tables. Of second-class cruisers we have thirty-seven built and thirteen building, including the eight ships of the Arethusa type laid down in 1912–13, which carry side armour. Germany has ten built and six building. France and Russia have some six ships each. Most of the French vessels are out of date or used as training-ships. Austria, Italy, and the United States have hardly any ships of this class. Russia is building six cruisers of 6500 tons and two of 4500 tons.

Of third-class cruisers we possess approximately the same number as Germany. For two of the German ships substitutes are already under construction. We have only the Fearless under construction. Austria is building three ships and Italy five, which are lightly armed scouts. With the exception of the recently completed Quarto, all the Italian small cruisers and all the French small cruisers must shortly disappear from the list. Several of the older ships have been struck out since last year. The outstanding feature of the cruiser tables is that the Austrian Navy is practically without cruisers, and that British superiority is most marked in the larger classes. In previous numbers of the *Naval Annual* we have repeatedly urged the need of more cruisers for the protection of our commerce and our interests overseas, as well as to act as the eyes of our fleets. In the Arethusa class we have exactly the type of vessel required—of good speed, respectably armed with eight or nine 6-in. guns, and well protected, but not too large or too costly to permit us building them in sufficient numbers. It is satisfactory to know that eight more ships of this class are included in the Navy Estimates for 1913–14.

Conclusion. The foregoing survey of the present strength of the various navies and of the programmes of construction in process of execution, or about to be put in hand, leads to the conclusion that the position of the British Navy, relatively to those of other Powers, is not unsatisfactory now, and that it will at least be maintained in the

near future by the proposals of the Admiralty as regards new construction. These proposals involve large increased charges for maintenance and for manning, which are at present borne almost entirely by the taxpayers of the Mother Country. The burden is borne with comparative ease (at any rate, it only presses heavily on the shoulders of the few who are taxed out of their homes by death duties) during a period of prosperity such as that we are now enjoying. But it is evident that the resources of the whole Empire must be drawn upon if the naval defence of the Empire is to be adequately provided for at all points. This subject is dealt with in a later chapter. The present writer would only reiterate the opinion that the policy of concentration in Home waters is being carried to a greater extent than is required by present circumstances, and that the character and efficiency of the British Navy cannot be maintained unless the force on foreign stations be increased.

HYTHE.

TABLE I.—MODERN BATTLESHIPS.

GREAT BRITAIN. Launched.	Name.	Displacement.
		tons.
	Malaya	
	Barham	‡
	Queen Elizabeth	27,500
	Warspite	
	Valiant	
1912	*Iron Duke* ...	‡
1912	*Marlborough* ...	25,000
	Delhi...	
	Benbow	
1911	King George V.	
1912	*Ajax*	23,000
1912	*Audacious* ...	
1911	Centurion ...	
1911	Conqueror ...	
1911	Monarch	22,500
1911	Thunderer ...	
1910	Orion	
1910	Colossus	20,000
1910	Hercules	
1909	Neptune	19,900
1908	Collingwood ...	
1908	St. Vincent ...	19,250
1909	Vanguard ...	
1907	Bellerophon ...	
1907	Temeraire ...	18,600
1907	Superb	
1906	Dreadnought ..	17,900
1906	Lord Nelson ...	16,500
1906	Agamemnon ...	
	29 ships.*	643,850

GERMANY. Launched.	Name	Displacement.
		tons.
	Ers. Worth ...	‡
	T	27,000
	ErsBrandenburg	
	Ers Weissenburg	‡
	Ers K. F. Wilhelm	25,000
1913	*Konig*	
1911	*Kaiserin*	
1912	*Konig Albert* ...	
1912	*Prinz Luitpold*	24,310
1911	Friedrich der Grosse	
1911	Kaiser	
1910	Oldenburg ...	
1909	Thuringen ...	22,500
1909	Ostfriesland ...	
1909	Helgoland ...	
1908	Posen	
1908	Rheinland ...	18,200
1908	Nassau	
1908	Westfalen ...	
	19 ships.	440,350

AUSTRIA-HUNGARY. Launched.	Name.	Displacement.
		tons.
1911	Viribus Unitis...	
1912	*Prinz Eugen* ...	20,000
	No. VII.	
1912	*Tegetthoff*... ...	
	4 ships.	80,000

ITALY. Launched.	Name.	Displacement.
		tons.
	Dandolo†	28,000
1913	*Morosini*† ...	
	Doria	21,500
	Duilio	
1911	*Conte di Cavour*	
1911	*Giulio Cesare* ...	21,500
1911	*Leonardo da Vinci*	
1910	Dante Alighieri	18,300
	8 ships.	181,800

FRANCE. Launched.	Name.	Displacement.
		tons.
	Languedoc ...	
	Flandre	24,800
	Gascogne	
	Normandie ...	
	Bretagne	
	Lorraine	23,600
	Provence	
1912	*France*	
1912	*Paris*	23,100
1911	*Courbet*	
1911	*Jean Bart* ...	
1909	Danton	
1909	Condorcet ...	
1909	Diderot	18,028
1909	Mirabeau... ...	
1910	Vergniaud ...	
1909	Voltaire	
	17 ships.	270,568

RUSSIA. Launched.	Name.	Displacement.
		tons.
	Ekaterina II.§	
	Alexander III.§	22,500
	Imperatritsa§ *Maria*	
1911	*Sevastopol* ...	
1911	*Petropavlosk* ...	23,000
1911	*Gangut*	
1911	*Poltava*	
1907	Imperator Pavel I.	17,200
1906	Andrei Pervozvannyi ...	
	9 ships.	193,900

UNITED STATES. Launched.	Name.	Displacement.
		tons.
	Pennsylvania...	31,400
	Nevada	27,500
	Oklahoma ...	
1912	*New York* ...	27,000
1912	*Texas*	
1911	Wyoming... ...	26,000
1911	Arkansas	
1910	Florida	21,825
1909	Utah	
1909	Delaware	20,000
1908	North Dakota ...	
1908	Michigan	16,000
1908	South Carolina	
	13 ships.	308,050

* 5 projected. † Doubtful if yet laid down. ‡ Doubtful. § Black Sea.

TABLE II.—BATTLE-CRUISERS.

GREAT BRITAIN. Ld.	Name.	Tons.
	Tiger...	28,000†
1912	*Queen Mary* ...	27,000
1911	Princess Royal	26,350
1910	Lion	
1911	New Zealand ...	18,800
1911	*Australia** ...	
1909	Indefatigable ...	18,750
1907	Indomitable ..	
1907	Inflexible	17,250
1907	Invincible	
	10 ships.	215,800

GERMANY. Ld.	Name.	Tons.
	Ers. Hertha ...	†
	Ers. Kaiserin Augusta ...	30,000
	K.	†
1912	*Seydlitz*	24,000
1911	Goeben	22,600
1910	Moltke	
1909	Von der Tann...	18,700
	7 ships.	177,900

RUSSIA. Ld.	Name.	Tons.
	Borodino	†
	Ismail	30,000
	Navarin	
	Kinburn	
	4 ships.	120,000

* Australian Navy. † Doubtful.

TABLE III.—OLDER BATTLESHIPS.

GREAT BRITAIN.

Launched.	Name.	Displacement.
		tons.
1903	Edward VII.	
1903	Commonwealth	
1903	Dominion	
1903	Hindustan	16,350
1904	New Zealand	
1905	Africa	
1904	Britannia	
1905	Hibernia	
1903	Swiftsure	11,800
1903	Triumph	
1902	Queen	15,000
1902	Prince of Wales	
1901	Albemarle	
1901	Cornwallis	
1901	Duncan	14,000
1901	Exmouth	
1901	Russell	
1898	Formidable	
1898	Irresistible	
1899	Implacable	
1899	London	15,000
1899	Venerable	
1899	Bulwark	
1897	Canopus	
1899	Glory	
1898	Albion	12,950
1898	Goliath	
1898	Ocean	
1899	Vengeance	
1894	Magnificent	
1895	Majestic	
1895	Prince George	
1895	Victorious	
1896	Cæsar	14,900
1896	Hannibal	
1896	Illustrious	
1895	Jupiter	
1896	Mars	
	38 ships.	556,200

GERMANY.

Launched.	Name.	Displacement.
		tons.
1904	Deutschland	
1905	Hannover	
1905	Pommern	13,040
1906	Schlesien	
1906	Schleswig-Holstein	
1902	Braunschweig	
1903	Elsass	
1903	Hessen	12,997
1903	Preussen	
1904	Lothringen	
1900	Wittelsbach	
1901	Wettin	
1901	Zahringen	11,643
1901	Mecklenburg	
1901	Schwaben	
1896	Kaiser Friedrich III.	
1897	Kaiser Wilhelm II	
1899	Kaiser Wilhelm der Grosse	10,974
1900	Kaiser Barbarossa	
1899	Kaiser Karl der Grosse	
	20 ships.	243,270

AUSTRIA-HUNGARY.

Launched	Name.	Displacement.
		tons.
1908	Erz. Franz Ferdinand	14,226
1909	Radetzky	
1910	Zrinyi	
1904	Erz. Friedrich	
1903	Erz. Karl	10,433
1905	Ferdinand Max	
1901	Arpád	
1902	Babenberg	8,208
1900	Habsburg	
	9 ships.	98,601

ITALY.

Launched.	Name.	Displacement.
		tons.
1904	Regina Elena	
1904	Emanuele III.	12,425
1907	Roma	
1905	Napoli	
1901	Ra Margherita	13,214
1901	Benedetto Brin	
1897	E. Filiberto	9,645
1897	Saint Bon	
	8 ships.	95,418

FRANCE.

Launched.	Name.	Displacement.
		tons.
1903	Patrie	
1902	République	
1904	Justice	14,635
1907	Vérité	
1904	Démocratie	
1899	Suffren	12,527
1896	Bouvet	12,007
1895	Masséna	11,735
1896	St. Louis	11,090
1896	Gaulois	11,105
1895	Charlemagne	11,108
1893	Jauréguiberry	11,637
1893	Charles Martel	11,693
1894	Carnot	11,954
1899	Henri IV.	8,807
	15 ships.	186,838

RUSSIA.

Launched.	Name.	Displacement.
		tons.
1906	Ioann Zlatoust§	12,733
1906	Evstafi§	
1903	Slava	13,516
1901	Cesarevitch	12,912
1900	Panteleimon	12,582
1893	Tria Sviatitelia	13,318
1892	Georgi Pobiedonosetz	10,280
1896	Rostislav	8,880
	8 ships.	96,954

UNITED STATES.

Launched.	Name.	Displacement.
		tons.
1905	Idaho	13,000
1905	Mississippi	
1904	Connecticut	
1905	Kansas	
1904	Louisiana	16,000
1905	Minnesota	
1906	New Hampshire	
1905	Vermont	
1904	Georgia	
1904	Nebraska	
1904	New Jersey	14,948
1904	Rhode Island	
1904	Virginia	
1901	Ohio	12,440
1901	Maine	12,300
1901	Missouri	
1898	Wisconsin	11,653
1898	Alabama	11,565
1898	Illinois	
1898	Kearsarge	11,540
1898	Kentucky	
1896	Iowa	11,340
1893	Indiana	
1893	Massachusetts	10,288
1893	Oregon	
	25 ships.	333,847

§ Black Sea.

Table IV.—First-Class Cruisers.

GREAT BRITAIN.

Speed.	Name.	Displacement.
kts.		tons.
22¼	Minotaur... ...	
22¼	Shannon	14,600
22¼	Defence	
23	Duke of Edinburgh	
23	Black Prince ...	13,550
23	Achilles	
23	Cochrane	
23	Natal	
23	Warrior	
22¼	Devonshire ...	
22¼	Antrim	
22¼	Argyll	10,850
22¼	Carnarvon ...	
22¼	Hampshire ...	
22¼	Roxburgh ...	
23	Monmouth ...	
23	Kent	
23	Essex	
23	Berwick	
23	Cornwall	9,800
23	Cumberland ...	
23	Donegal	
23	Lancaster ...	
23	Suffolk	
23	Drake	
23	Good Hope ...	14,100
23	King Alfred ...	
23	Leviathan ...	
21	Aboukir	
21	Bacchante ...	
21	Cressy	12,000
21	Euryalus	
21	Hogue	
21	Sutlej	
20¼	Amphitrite* ...	
20¼	Argonaut* ...	11,000
20¼	Ariadne*	
20¼	Spartiate*... ...	
20¼	Andromeda* ...	
20¼	Diadem*	11,000
20¼	Europa*	
20¼	Niobe*†	
	42 ships.	494,800

GERMANY.

Speed.	Name.	Displacement.
kts.		tons.
23	Blücher	15,550
22¼	Scharnhorst ...	11,420
22¼	Gneisenau ...	
21	Roon...	9,350
21	Yorck	
20¼	Prinz Adalbert	8,858
20¼	Friedrich Karl...	
20¼	Prinz Heinrich	8,759
19	Fürst Bismarck	10,570
	9 ships.	94,135

AUSTRIA-HUNGARY.

Speed.	Name.	Displacement.
kts.		tons.
22	St. Georg	7,185
	1 ship.	7,185

ITALY.

Speed.	Name.	Displacement.
kts.		tons.
22¼	Amalfi	9,956
22¼	Pisa	
22¼	San Giorgio ...	9,832
22¼	San Marco ...	
20	Giuseppe Garibaldi	7,294
20	Varese	
20	F. Ferruccio ...	
	7 ships.	61,458

FRANCE.

Speed.	Name.	Displacement.
kts.		tons.
23	Edgard Quinet	13,780
23	Waldeck-Rousseau ...	
23	Ernest Renan...	13,427
23	Jules Michelet	12,370
22	Léon Gambetta	
22	Jules Ferry ...	12,351
22	Victor Hugo ...	
21	Condé	
21	Gloire	9,856
21	Marseillaise ...	
21	Amiral Aube ...	
21	Gueydon	
21	Montcalm ..	9,367
21	Dupetit Thouars	
21	Jeanne d'Arc ...	11,092
21	Desaix	
21	Dupleix	7,578
21	Kleber	
	18 ships.	191,761

RUSSIA.

Speed.	Name.	Displacement.
kts.		tons.
21	Rurik	15,170
22	Adm. Makaroff	
21	Bayan	7,900
21	Pallada	
20	Gromoboi	12,336
20	Rossia	12,130
	6 ships.	63,336

UNITED STATES.

Speed.	Name.	Displacement.
kts.		tons.
22	Washington ...	
22	Tennessee ...	14,500
22	Montana	
22	North Carolina	
22	St. Louis	
22	Charleston ..	9,700
22	Milwaukee ...	
22	West Virginia	
22	California ...	
22	Colorado	13,680
22	Maryland... ...	
22	Pittsburg... ...	
22	South Dakota ...	
21	Saratoga	8,200
21	Brooklyn	9,215
	15 ships.	186,595

* Protected Cruisers. † Canada.

TABLE V.—LIGHT CRUISERS.

GREAT BRITAIN.

Speed.	Name.	Displacement.
kts.		tons.
29*	*Arethusa*	
29	*Aurora*	
29	*Galatea*	
29	*Inconstant* ...	4,000*
29	*Penelope*	
29	*Phaeton*	
29	*Royalist*	
26	*Undaunted* ...	
26	*Birmingham* ...	
26	*Lowestoft*... ...	
26	*Nottingham* ...	5,440
	Brisbane† ...	
25½	Chatham	
25½	Dublin	
25½	Southampton ...	5,400
25½	Melbourne† ...	
25½	*Sydney*†	
24¾	Dartmouth ...	
24¾	Falmouth... ...	5,250
24¾	Weymouth ...	
24¾	Yarmouth ...	
25	Bristol	
25	Glasgow	
25	Gloucester ...	4,800
25	Liverpool... ...	
25	Newcastle ...	
19¾	Crescent	7,700
20	Edgar	7,350
20	Endymion ...	7,350
19¾	Gibraltar	7,700
20	Grafton	7,350
20	Hawke	7,356
19¾	Royal Arthur ...	7.700
20	Theseus	7,350
19½	Diana	
19½	Dido	
19½	Doris...	
19½	Eclipse	
19½	Isis	5,600
19½	Juno	
19½	Minerva	
19½	Talbot	
19½	Venus	
19	Furious	5, 750
19	Vindictive ...	

GERMANY.

Speed.	Name.	Displacement.
kts.		tons.
27	*Ers. Gefion* ...	5,000*
27	*Ers. Hela* ...	
27	*Ers. Irene* ...	
27	*Ers. Prinzess Wilhelm* ...	4,830
27	*Karlsruhe* ...	
27	*Rostock*	
27	Stralsund... ...	
27	Strassburg ...	4,500
27	Breslau	
27	Magdeburg ...	
21	Kaiserin Augusta	5,956
19½	Freya	
19½	Hertha	5,569
19½	Victoria Luise	
19½	Hansa	5,791
19½	Vineta	

AUSTRIA-HUNGARY.

Speed.	Name.	Displacement.
kts.		tons.
22	K. Maria Theresia	5,187
19	Karl VI.	6,151
20¼		
27		
27		
27		
27		
20		
20		
20		

ITALY.

Speed.	Name.	Displacement.
kts.		tons.
20	Carlo Alberto ...	6,396
20	Vettor Pisani ...	

FRANCE.

Speed.	Name.	Displacement.
kts.		tons.
19	D'Entrecasteaux	7,995
23	Guichen	8,151
23	Châteaurenault	7,898
18	Bruix	4,735
18	Charner	4,702
19	Pothuau	5,374
23	Jurien de la Gravière ...	5,595

RUSSIA.

Speed.	Name.	Displacement.
kts.		tons.
	A	
	B	6,500
	C	
	D	
20	Aurora	6,731
23	Askold	5,905
23	Bogatyr	
23	Kagul	
23	Pamyat Mercuria ...	6,675
23	Oleg	
27	*E*	4,500
27	*F*	

UNITED STATES.

Speed.	Name.	Displacement.
kts.		tons.
22·8	Columbia	7,375
23	Minneapolis ...	
21½	Olympia	5,870

20	Hermes	5,600																		
20	Highflyer... ...																			
20	Hyacinth																			
21	Challenger ...	5,880																		
21	Encounter ...																			
25	*Fearless*		27	Augsburg ...	4,280	26	Adm. Spaun ...	3,500	22	*Libia*	3,800	20	Lavoisier	2,285	19	Almaz	3,285	24	Birmingham ...	3,750
25	Active	3,440	27	Köln		27	*Saida*		22	*Basilicata* ...	2,600	20½	D'Estrées... ...	2,421	23	Jemtchug ...	3,106	24	Chester	
25	Amphion		25½	Kolberg	4,234	27	*Helgoland* ...		22	*Campania* ...		19½	Friant	3,882				24	Salem	
25	Blonde		25½	Mainz		27	*Novara*		29	Quarto	3,250	19	Descartes	3,970				20	Albany	3,487
25	Blanche	3,350	24½	Emden	3,544	20	Aspern	2,362	29	*Marsala*	3,400	19	Cassard	3,890				20	New Orleans ...	
25	Bellona		24½	Dresden		20	Szigetvar	2,313	29	*Nino Bixio* ...		19	Du Chayla ...	3,890				19	Cincinnati ...	3,213
25	Boadicea	3,300	23½	Stuttgart	3,396	20	Zenta	2,264	21	Piemonte	2,597							19	Raleigh	
23	Amethyst... ...	3,000	23½	Nürnberg... ...					17	Calabria	2,428									
22	Diamond		23½	Stettin	3,346				18	Elba	2,690									
22	Sapphire		23	Königsberg ...					19	Etruria	2,245									
22	Topase		23	Bremen	3,200				18	Liguria										
19½	Astræa	4,360	23	Hamburg ...					20	Puglia	2,498									
19½	Cambrian... ...		23	Berlin																
19½	Charybdis ...		23	Munchen																
19½	Flora...		23	Lubeck																
19½	Forte...		23	Leipzig																
19½	Fox		23	Danzig																
19½	Hermione... ...		21½	Frauenlob ...	2,657															
19¾	Æolus	3,600	21½	Arcona																
19¾	Melpomene ...	3,400	21½	Undine																
20	Sappho		21	Medusa	2,618															
19¾	Sirius	3,600	21	Nymphe																
19	Philomel	2,575	21	Amazone																
20½	Pelorus	2,135	21	Ariadne																
20	Proserpine ..		21½	Thetis																
20	Pegasus		21	Gäzelle	2,603															
20	Perseus		21	Niobe																
20	Prometheus ...		20	Gefion	3,712															
20	Pyramus		20	Irene...	4,283															
20	Pandora	2,200	19	Prinzess Wilhelm ...																
20	Pioneer*																			
20	Psyche																			
25	Adventure ...	2,670																		
25	Attentive... ...																			
25	Foresight... ...	2,850																		
25	Forward																			
25	Patrol	2,940																		
25	Pathfinder ...																			
25	Sentinel	2,895																		
25	Skirmisher ...																			
	90 ships.‡	397,515		46 ships.	180,060		9 ships.	32,277		14 ships	46,545		13 ships.	69,469		15 ships.¶	87,267		10 ships	45,270

* Estimated. † Australian Navy. ‡ Eight projected. ¶ Two for Black Sea projected.

Effective Fighting Ships, Built and Building.

Class.	Great Britain.			Germany.			Austria-Hungary			Italy.			France.			Russia.			United States.		
	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.
Battleships:—																					
Modern ...	18	11	29	10	9	19	1	3	4	1	7	8	6	11	17	2	7	9	8	5	13
Cruiser ...	7	3	10	3	4	7	—	—	—	—	—	—	—	—	—	—	4	4	—	—	—
Older... ...	38	—	38	20	—	20	9	—	9	8	—	8	15	—	15	8	—	8	25	—	25
Total ...	63	14	77	33	13	46	10	3	13	9	7	16	21	11	32	10	11	21	33	5	38
Cruisers:—																					
1st Class ...	42	—	42	9	—	9	1	—	1	7	—	7	18	—	18	6	—	6	15	—	15
Light ...	76	14	90	40	6	46	6	3	9	9	5	14	13	—	13	8	6	14	10	—	10
Total ...	118	14	132	49	6	55	7	3	10	16	5	21	31	—	31	14	6	20	25	—	25

Torpedo Flotillas.

Class.	Great Britain.			Germany.			Austria-Hungary			Italy.			France.			Russia.			United States.		
	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.
Destroyers ..	193	34	227†	127	14	141‡	14	4	18	27	8	35††	75	12	87	96	9	105**	41	14	55
Torpedo Boats* 1st & 2nd Class	58	—	58	47	—	47	41	12	53	57	16	73	173	—	173	23	—	23	24	—	24
Submarine Boats	66	19	85	18	12	30	8	7	15	17	3	20	76	14§	90	30	18	48	28	16	44

*** Excluding boats over 20 years old. † 16 projected. ‡ 12 projected. § 3 projected. ** 36 to be built 1912–17. †† 15 projected.**

Total Naval Expenditure, Voted or Estimated.

	Great Britain.	Germany.	Italy.	France.	Russia.	Austria-Hungary.	United States.
	£	£	£	£	£	£	£
1904	36,859,681	10,102,740	5,000,000	12,382,433	11,949,906	2,615,460	20,180,310
1905	33,151,841	11,301,370	5,040,000	12,667,856	12,392,684	3,838,975	24,444,948
1906	31,472,087	12,005,871	5,322,154	12,245,740	12,490,444	2,398,223	21,358,199
1907	31,251,156	14,225,000	5,661,822	12,486,793	8,850,240	2,713,540	21,260,732
1908	32,181,309	16,490,000	6,266,193	12,797,308	10,222,733	2,477,671	26,438,434
1909	35,734,015	19,702,685	6,537,118	13,353,825	9,650,167	4,068,333	28,990,592
1910	40,419,336	20,845,000	8,341,766	15,023,019	9,723,574	3,545,727	27,848,111
1911	42,414,257	22,031,788	8,379,940	17,370,960	11,693,870	5,152,382	26,569,606
1912	45,075,400	22,609,540	8,566,505	18,090,758	17,681,207	5,823,203	25,944,798
1913	46,309,300	22,887,870	10,269,460	18,626,755	24,477,487	5,985,715	28,932,630

Amount Voted or Estimated for New Construction.

The Actual Expenditure for Great Britain is shown in Italics.

	Great Britain.	Germany.	Italy.	France.	Russia.	Austria-Hungary.	U. States.
	£	£	£	£	£	£	£
1904	13,508,176 (*13,184,419*)	4,275,489	1,121,753	4,370,102	4,480,188	1,329,590	6,611,909
1905	11,291,002 (*11,368,744*)	4,720,206	1,714,556	4,705,295	4,576,370	2,371,916	8,683,000
1906	10,859,500 (*10,486,397*)	5,167,319	1,362,207	4,652,010	4,576,583	1,012,499	6,776,086
1907	9,227,000 (*8,849,589*)	5,910,959	1,398,111	4,138,967	2,846,268	1,186,667	4,872,888
1908	8,660,202 (*8,521,930*)	7,795,499	1,866,358	4,193,544	2,703,721	716,662	6,227,874
1909	11,227,194* (*11,076,551*)	10,177,062	2,190,707	4,517,766	1,758,487	1,908,331	7,976,897
1910	14,957,430 (*14,755,259*)	11,392,856	2,981,200	4,977,682	1,424,013	1,583,333	6,889,005
1911	17,566,877 (*15,059,881*)	11,710,859	2,677,302	5,876,659	3,216,396	3,125,000	5,343,789
1912	17,271,527 (*14,595,527*)	11,491,187	2,400,000‡	6,997,582	7,940,094	3,620,881	4,998,145
1913	13,276,400	11,176,407	2,800,000‡	7,595,010	10,953,616	3,280,473†	§8,459,194

* Includes Supplementary Estimate, £689,100.

† Part of a supplementary vote will be expended during the year; the totals for 1905–7 include charges for submarine stations, &c.

‡ Should be increased by sum available under Law of 1911.

§ Amount in original Estimates, subsequently reduced by Congress.

CHAPTER IV.

Comparison of Different Types of Warship Machinery.

The features of the year, so far as naval engineering is concerned, are (1) the ease with which new British warships have passed through their contract trials and with which commissioned ships have carried out their quarterly tests; (2) the reliability of turbines, boilers, and auxiliary machinery in ships, and the consequent absence of repair work in the dockyards and in the repair ships attached to the squadrons; and (3) the continued keen interest in all work undertaken to solve the difficulties associated with internal-combustion machinery—work which is largely experimental as regards the propulsion of warships, but practical in so far as it relates to merchantmen. This interest has been quickened by the investigations of the Commission, presided over by Admiral Lord Fisher of Kilverstone, appointed by the Admiralty to consider the sources of oil supply, the location and protection of oil storage tanks, and the extent to which oil should be used in the Service, either for generating steam in boilers or for directly operating internal-combustion engines.

Proposals for internal-combustion engines in warships.

Several firms who have taken up the study, if not also the manufacture, of internal-combustion engines—and these in this country now number about twenty-five—have appeared before the Commission, and some of them have produced proposals for the fitting of internal-combustion engines into various types of warships, principally battleships. These designs, of course, are necessarily confidential; but in order to focus attention more definitely than has been possible in previous issues of the *Naval Annual*, application has been made to various firms, in this country and on the Continent, for information as to installations of various types of machinery for battleships and torpedo-boat destroyers, in order that the results of the experience and experiments of such firms may be utilised to indicate with some degree of definiteness the possibilities of the oil engine in comparison with existing and proposed applications of turbine machinery. It is important that such comparison should be made not only with the best realised results with turbines driving directly on the propeller shaft, but with installations embodying the

latest practice, including the use of superheated steam, of combined impulse and reaction turbines, and of speed reduction gear interposed between the fast-running turbine and the relatively slow-running screw propeller.

Limitations in comparisons. It may be explained, at the outset, that, while every care has been exercised to ensure accuracy as regards the estimates of the relation of power, weight, space occupied and fuel consumption for each of the proposed installations of machinery, these are not put forward as completely reliable, but rather to indicate the possibilities of each system of propulsion as well as the trend of thought on the part of manufacturers of such machinery. They are, of course, largely speculative but none the less interesting; moreover, it is desirable that there should be some more definite basis for discussion than is provided by a consideration of general claims for the respective types of machinery or even of the results of applications in the Merchant Service, where conditions are not always analogous to those obtaining in the Royal Navy.

Progress with turbine machinery. Turbine installations in the latest warships, whether for British or foreign navies, show that great advance has been made within a very short time, and there is every prospect of this progress being maintained. In last year's *Naval Annual* an attempt was made to show that it would be possible to increase the power, and therefore the speed, of warships, especially in cases of emergency, by resorting to a slightly higher degree of air pressure in the stokeholds, more particularly where oil fuel makes this possible without risk to the boilers. It was also contended that superheated steam should be used. There is now no doubt that both measures will be included in general practice in the early future, and thereby the rate of progress will be accelerated. In a typical battleship laid down three or four years ago, the propelling machinery, including all necessary auxiliaries, weighed just over 140 lb. per S.H.P., while in ships building now the weight is not more than 100 lb. per S.H.P. The reduction in five years has been, in the case of light cruisers, from 100 lb. to between 55 lb. and 60 lb. per S.H.P., and in torpedo-boat destroyers from 50 lb. to 32 lb. or 34 lb. per S.H.P. These figures illustrate emphatically the increase in weight which has to be made to secure the higher degree of reliability necessary to ensure that battleships shall be capable of steaming for prolonged periods at full speed. Coal consumption results continue to show improvement, not only because of the higher efficiency of the turbine, but also because of the improvement in boiler design. In armoured ships three or four years ago the rate of consumption on the basis of oil was about 1·2 lb. per S.H.P. per hour, and it is now little more than 1 lb.; indeed, in one or two

instances it is under this. With destroyers the consumption at full power has been brought down to about 0·9 lb. per S.H.P. per hour. Where steam superheated to the extent of 100 deg. F. has been introduced there has been a reduction in fuel consumption equal to 10 per cent. at full speed, other conditions being the same. The steam required in such case by the turbine has been only about 12 lb. per S.H.P. per hour. In connection with an installation of Parsons turbines and electric generator for a power station in America, to give an output of 25,000 kilowatts, there has been guaranteed a steam consumption of 8 lb. of steam per S.H.P. per hour, the steam being superheated to the extent of 200 deg. F. The oil consumption should thus only be 0·6 lb. per S.H.P. per hour if ample boiler capacity is provided. There is reason to believe that similar results will be achieved with turbines in warships, provided some means of transmitting the power can be utilised so that a high speed of rotation of the turbines can be maintained while the propeller is run at a rate ensuring high screw efficiency. As regards the space occupied by turbine machinery in warships there has also been improvement. In the case of a battleship, five years ago 0·35 sq. ft. were required per H.P. developed, whereas in later ships the figure is only one-half this rate. In the case of cruisers the comparative figures are 0·264 sq. ft. and 0·124 sq. ft. It need scarcely be added that the results of five years ago marked great reductions on those got with reciprocating steam machinery, but a large part of the gain is due to the boilers.

Advantage of speed-reduction gear.

The advantage which may accrue from the introduction of speed-reduction gear between the turbine and the propeller is easily explained. Popularly expressed, the thermodynamic efficiency of a turbine depends largely on the speed of the blades around the circumference of its rotor being in proper relation to the velocity of the steam impinging on the blades. The peripheral speed of the drum of a turbine carrying the blades therefore requires to be high. The screw propeller of a ship, after it exceeds a given rate of speed, falls off somewhat in efficiency owing to the friction of the blades with the water and also owing to cavitation which, popularly explained, means the introduction of air in front of the blade surface. The result is not only a reduction in efficiency but serious deterioration of the metal by erosion. It is true that this latter difficulty has been partly overcome, but it is inevitable that with cavitation there should be great loss in the driving power of the screw. To overcome the difficulty a compromise was made by increasing the diameter of the turbine drum, so that the number of revolutions was reduced without a proportionate lessening of the blade speed,

which could thus be kept not too much below the velocity of steam. At the same time the revolutions of the propeller were lessened. Increase in the diameter of the turbine rotor, however, involved considerable augmentation of weight. The difference in weight per H.P. of battleship and destroyer turbines is partly due to the turbines in the latter being run at a greater number of revolutions per minute.

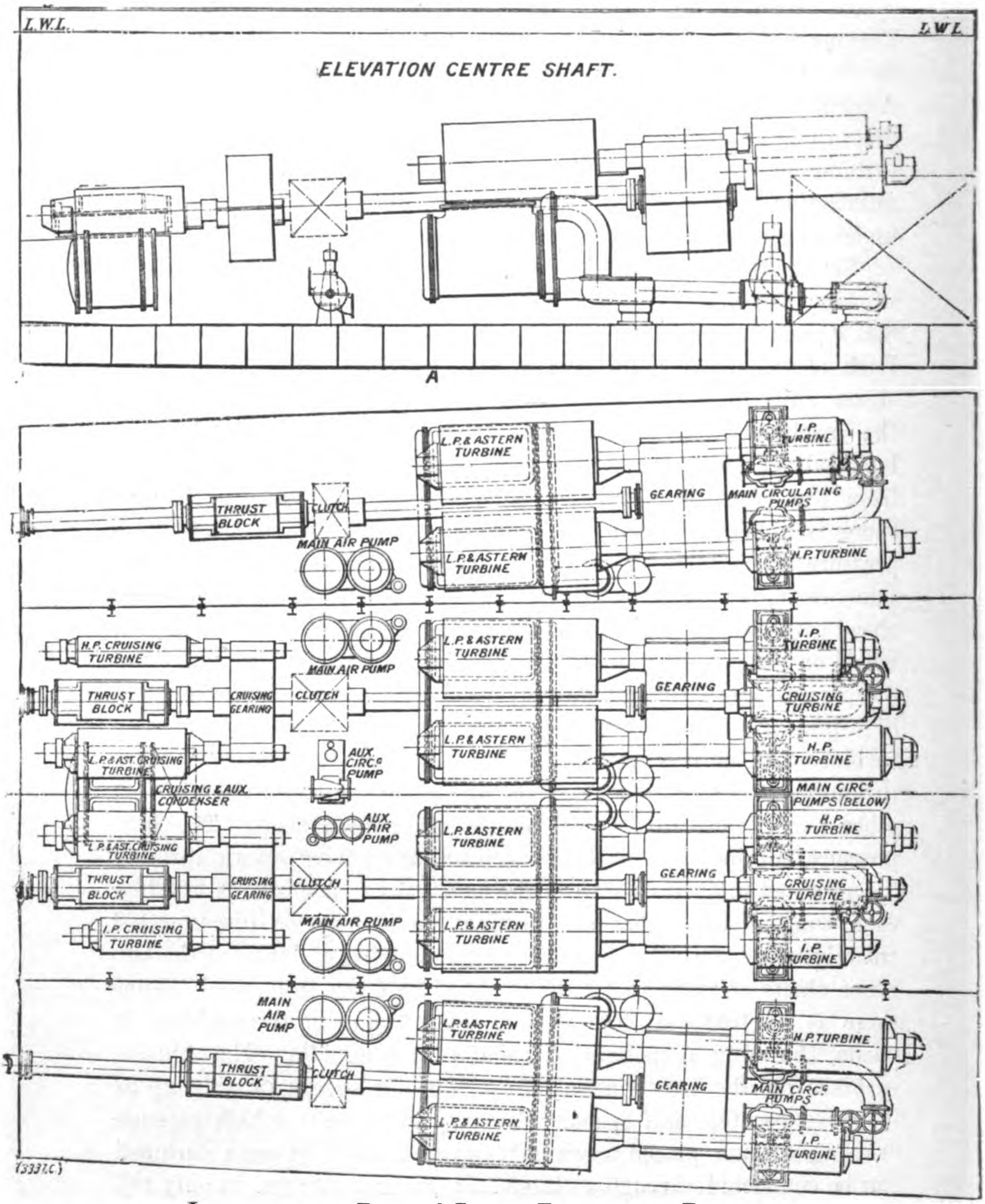
Evolution of gearing

This problem of the relative speed of engine and propeller presented itself more than thirty years ago. Then the advantages to be realised by utilising quick-running reciprocating engines, for other classes of warships besides torpedo boats, suggested the idea of introducing reducing gear to the late Sir William White, then Director of Naval Construction at the Admiralty. On his initiation the late Dr. Alexander C. Kirk worked out a design on this principle for the machinery of a cruiser, but the inherent objection to gearing as made at the time resulted in the project being abandoned. The success achieved with the helical gearing introduced later by the late Dr. de Laval in connection with his one-stage impulse turbines offered an efficient method of gearing down the speed of rotation. For the benefit of the layman it may be said that helical gear differs from ordinary tooth gear, in that the teeth are cut on the circumference of the wheel spirally, somewhat similarly to the rifling of the bore of a gun. As early as 1897, Sir Charles Parsons fitted such reducing gear in a steam launch in connection with a 10 H.P. turbine installation in order to carry out practical tests. Following this came the application by his firm of the system to the cargo ship Vespasian. Here, again, it was shown not only that high economy could be attained, but that reliability of operation and durability of the working parts were ensured. Since then Sir Charles Parsons has prosecuted his researches and with marked success. So far, the most important installation is in two channel steamers running between Southampton and Havre. This installation was described in the last issue of the *Naval Annual*, but the results were not then available. Comparison is possible with data from a steamer having turbines working the propeller without reduction gear. The saving in fuel in the geared turbine vessel at the service speed was about 40 per cent. The steam consumption of the propelling engines only was about 12 lb. per S.H.P. per hour in the geared turbine ship and about 15 lb. in the ship without gear. As regards the noise which it was said would be caused by the running of the gear, a passenger sleeping in a berth almost immediately above the gear experiences no disadvantage beyond that inevitable in any steamship. The loss due to transmission is only from 1½ per cent. to 2 per cent., which is much more than compensated for by the higher economy of

the turbine, as these may run at a much higher speed, and by the higher efficiency of the propellers running at a much lower speed. Gearing has been, or is being, applied in connection with Parsons turbines to the extent of over 150,000 S.H.P., and is to be fitted to a large liner being built for the Orient Company's Australian mail service. So far as Navy ships are concerned, the first application was for gearing the cruising and high pressure turbines in torpedo-boat destroyers, and this arrangement is giving satisfaction in service. Various other applications of helical gear are under consideration, not only in this country, but abroad.

Geared turbines for battleship. Sir Charles Parsons has also proposed a design of turbines, all working through gear, for a four-screw battleship of about 60,000 S.H.P., and this proposed installation is illustrated on the next page. Each shaft is driven by four ahead turbines, forming a complete steam unit. The four sets are in three water-tight compartments, the machinery space athwart the ship being sub-divided by two longitudinal bulkheads, so that the wing-shaft units are separated from the two units on the inner shafts. In each such unit there is a high-pressure, an intermediate pressure, and two low-pressure ahead turbines, and two astern turbines, which are in the same casing as the low-pressure ahead turbines. Each of the main ahead turbines drives a separate pinion, engaging with a common gear wheel on the propeller shaft. To the inner shafts is also connected a separate installation of geared cruising turbines, consisting of a high-pressure, an intermediate-pressure, and two low-pressure turbines, but in this case two of the four pinions driven by these turbines are geared to a wheel on one of the inner shafts, and the other two pinions to a wheel on the other inner shaft. The low-pressure turbines of this cruising installation have astern turbines incorporated in their casings in the usual way. A clutch is fitted on each wing shaft so that the turbines on it may be disconnected entirely when the ship is driven by the cruising turbines on the two inner shafts at any rate less than about half the full speed. Thus there is no frictional loss due to the rotating of the turbines in vacuo, the wing propellers and shafts running idle. The cruising turbines on the two inner shafts suffice for speeds ranging up to, if not exceeding, half speed. For very low speeds a high-pressure cruising turbine, placed forward between two of the main turbines, can be connected through a clutch, but at moderate speeds only two cruising turbines, those furthest aft, are run. Thus economy is ensured throughout a greater range of speed than in any previous installation provided. A separate condensing plant is provided for the cruising installation, or alternatively it may make use of the

condensing plant fitted for running the auxiliaries. Thus for driving ahead at full speed, or at a rate approximating to full speed, there



Installation of Parsons' Geared Turbines for Battleship.
(Reproduced from *Engineering* by permission of the Editor.)

are four turbines on each of the four shafts; for running full speed astern there are two turbines on each shaft; for cruising at half

speed two cruising turbines on each of the inner shafts, and at low speed a third or high-pressure turbine can be coupled up to increase the range of expansion. There are also two low-pressure astern turbines.

Benefits from geared turbines in battle-ships.

This arrangement is very compact. The superficial area of the engine-room is certainly not greater than in the latest battleships, and yet the arrangement ensures a distinctly greater economy, as compared with the usual design of direct-coupled turbines. The oil fuel consumption will be about 0·7 lb. per S.H.P. per hour at full power. The adoption of the complete cruising installation on the inner shafts, including high-pressure, intermediate and low-pressure turbines, will give a great improvement at low powers. In fact, the consumption of steam per S.H.P. at any cruising speed should be practically the same as at full speed. The turbines proposed are of the reaction type. The weights would be about the same as in the latest design of turbines driving direct on the propeller shaft. Superheated steam could be used with the turbines, with a further economy in steam consumption of about 1 per cent. for every 10 degrees of superheat. Other arrangements of turbines with mechanical gear are, of course, possible.

Hydraulic speed-reduction and reversing gear.

An alternative to the mechanical gear is afforded by the Föttinger transmitter. This is a hydraulic appliance for transmitting the power of the turbines or other prime mover to the propeller shaft, the latter being co-axial with the former. In this latter point the system differs from the mechanical gear. It is an hydraulic coupling transmitting the speed of the turbine at the same, a lower, or a higher rate. It can also be made to effect reversal so that the prime mover may continue to run continuously in the same direction and at the same speed, irrespective of the desired direction or rate of rotation of the propeller-shaft. The transmitter consists of a high-efficiency centrifugal pump driven direct by the turbine. This pump supplies water to water-turbines keyed on to the propeller-shaft, the water having the same effect on these wheels as in ordinary water-turbines. These are cast in brass, and are so combined that they form a compact, strong, and reliable gear.

First Föttinger gear.

The first Föttinger transmitter was fitted in 1909, and since then there has been considerable development, many installations having been provided for merchant vessels as well as land installations. In most instances the gear is used for reducing the speed, but in one instance—in the case of a vessel, fitted with Diesel engines, for navigation on the Congo—the gear is used for increasing the speed of the propeller relatively to that of the engine. As a rule, however, the transmitter is more extensively used for reducing the rate of speed and for reversing the direction of rotation. It also forms a

simple and efficient clutch. The largest installation so far made is for a Hamburg-American liner being built at the Vulcan works at Hamburg. The machine has been constructed to transmit normally 10,000 H.P., the turbines running at 850 revolutions a minute, while the propellers are to be run at 170 revolutions, a reduction of five to one. This installation has been completed, and exhaustive trials have been made in the workshops, sea conditions being closely simulated. The efficiency obtained has been found comparable to that of the smaller gears already in use, rising up to close upon 90 per cent., which means that about 10 per cent. of the power is absorbed in the gear. But to counterbalance this there is the gain due to the increased efficiency (1) of the turbine, consequent upon its higher blade-speed, and (2) of the propeller, because of its lower rate of revolution. The Föttinger gear is equally applicable to the transmission of power developed in oil engines, and an interesting application is about to be made by Messrs. Yarrow in two torpedo-boat destroyers, which are being built for the Japanese Government. To this reference will be made later in connection with machinery for destroyers.

Battleship with turbines and hydraulic gear.

Experience with this hydraulic transmission gear justifies some consideration of the advantage which might accrue from its adoption in a battleship as an alternative to other systems of machinery. Taking the power to be developed in such a battleship as 75,000 S.H.P., the proposal made is to fit three shafts, each driven by a complete and independent installation of impulse turbines and hydraulic transmission-gear, with separate condensers, etc. All three sets of machinery would be in the same athwartship machinery space, but would be separated from each other by longitudinal bulkheads. The proposal made is to use steam of about 170 deg. F. superheat. The boiler pressure is 250 lb. The turbines are to run at 1100 revolutions a minute, which is more closely analogous to electric generator driving practice than to the speed hitherto adopted in high-powered marine installations. The transmitter gear is to be designed to reduce the revolutions of the propeller to 220 per minute, a reduction ratio, as in the Hamburg-American liner, of five to one. This rate of revolution is designed to give a battleship of 26,000 tons displacement a speed of 25 knots to 26 knots. At half-power the turbines would run at 495 revolutions, and the propellers at 94 to 95 revolutions per minute. The calculated propeller efficiency for 25 knots to 26 knots speed is 72 per cent., and for half-speed at 75 per cent.

Benefits from hydraulic gear in battleship.

It is important to make the reservation that in this installation the degree of superheat and the turbine speed is greater than has ever before been attempted in large-powered ships in this country, although light cruisers in Germany work with 200 deg. F. of

superheat. High turbine speed and superheating affect the weight of machinery, space occupied, fuel consumption, and radius of action. As regards the weight of machinery, this is estimated at 900 tons, excluding the boilers and their auxiliaries, shafting and propeller. This works out at 27 lb. per S.H.P. A turbine installation without any transmission gear, without superheat, less boiler-pressure, and much lower turbine speed would, of course, be much weightier—nearly double. Less space is occupied, partly because the transmitter serves the purpose of astern turbines. Moreover, the proposal is to fit the condensers at the forward end of the turbines at a higher level, supported on girders athwart the engine-rooms. The fore and aft length of the three turbine rooms is thus about 60 ft. 10 in., and the width of the three combined 68 ft., leaving space between the outer engine-rooms and the skin of the ship, as in all battleships, for water-tight safety compartments. The height of the engine-room is 31 ft. 8 in., notwithstanding that the condenser is placed at a high level at the forward end; with a curved protective deck the whole of the engine-room could thus be protected, although it might not all be under the water-line. With oil of a heating value of 18,000 British thermal units the consumption at full power is estimated at 0·92 lb. per hour per S.H.P., and at half-speed 1·5 lb. Assuming that the 26,000-ton battleship carried a maximum oil supply of 1750 tons, the radius of action would be, at full speed, 1400 sea miles, and at half-speed 4700 sea miles.

Turbines with electrical transmission.

The other alternative proposal for transmitting power from the turbine or other prime mover is electrical, but little definite progress has been made in connection with this system during the past year. In last year's *Naval Annual* there is reference to an application being made by the United States naval authorities, in order to test without other important variant the use of reciprocating engines, of turbines with helical reduction gear and of turbines with electric transmission gear in three colliers being constructed for the United States Navy. Further details are now available. Each of the vessels is designed to have a displacement loaded of 20,000 tons and to attain a speed of 14 knots, the necessary I.H.P. being 5600 in the case of the ship—the Cyclops—with triple-expansion engine. In this vessel a satisfactory economy was obtained, the consumption of steam being equal to 14 lb. per S.H.P. hour. The Jupiter is the vessel fitted with turbines driving an electric generator, which supplies current to two electric motors coupled to the propeller shafts.

Application of electrical transmission.

The methods used on the Jupiter constitutes the simplest known form of electric power transmission, the plant, broadly speaking, being designed and built on exactly the lines adopted by the General

Electric Co. of America for land installations, and used there with immunity from trouble. The turbine for the Jupiter is a six-stage Curtis machine connected to a bi-polar alternator, the speed of the generator for 14 knots being about 2000 revolutions per minute and the voltage about 2200. This generating unit delivers electricity to two motors, one coupled directly to each propeller shaft. The motors have thirty-six poles, therefore the ratio of synchronous speed reduction is eighteen to one, the propeller at 14 knots speed being designed to run at 110 revolutions per minute. Connection between the parts of the electric equipment is provided through a switchboard, with oil switches for connecting the motors for either direction of rotation, and these show and record the electric power delivered to the motors. There are also two special resistance devices for use in circuit with the revolving part of the motors during the processes of reversing. The speed of the motors is to be changed by variations in the speed of the generating unit, not in the motor itself, the ratio of speed reduction remaining fixed. These changes are accomplished by means of a special governor, so arranged that it is capable of automatically holding the speed at any point from 5 knots to 14 knots. The setting of this governor is controlled from the switch platform, and the operating engineer can, without changing his position, run the vessel at any speed ahead or astern, and can stop and start, and can read on his instruments the speed and power delivered to each propeller. The generating unit is also equipped, separately from the governor, with an automatic device to trip the main steam-throttle in the supply-pipe of the turbine in case of excessive speed of the latter. At the time of writing this installation has not been tried on the collier.

Advantages of electrical system.

Mr. Henry A. Mavor, of Glasgow, who has devoted a considerable amount of attention to this subject, is fitting a Canadian steamer with oil engines and electric transmission, as described in last year's *Naval Annual*, and it has been ascertained in connection with this that the cost is about 7 per cent. greater than with ordinary machinery. He does not, however, consider that there is sufficient data available regarding the performance of the various vessels so far equipped with electric transmission to justify a definite statement as to an installation on this system for a battleship. There are, however, many points favourable to the adoption of such a system, and particularly in the possibility of the officer in command having visual evidence of the rate of revolution and of the power passing through the propeller shaft, and in the simplicity with which the machinery of the ship can be controlled from the bridge. With the development of the use of superheated steam associated with the introduction of

high-speed turbines, there are potentialities in the system which merit attention from naval authorities.

Marine oil engines.

In connection with the oil engine there has been accumulated a great amount of data regarding the performance of merchant ships at sea, all supporting the general advantages which have been enumerated in previous articles in the *Naval Annual.* There are, at the time of writing, forty-eight ships built, or being built, for sea-going merchant service, in addition to twenty-two tugs and twenty river boats, having oil engines of various designs of from 500 to 4000 B.H.P. The data accumulated from the sea-going performances of the oil vessels now in service are valuable. The weights per unit of power developed vary considerably up to 400 lb. per B.H.P.

Weight of oil engines.

The lighter engines are those designed to run at a high speed, and built particularly for submarine craft. The heavier engines are those in cargo ships, where weight is not a matter of importance in view of the low service speed. The latest German submarines are to have four-cycle engines, having a weight of about 54 lb. per B.H.P., and in their case the specifications require them to be run for six days continuously on the test-bed. Destroyer machinery, however, weighs less, but whether in all cases the basis is the same seems doubtful.

Experience with oil engines.

The oil engines at work in merchant ships have given fairly satisfactory results so far as mechanical details are concerned, although difficulty has been experienced in many cases in connection with the valves, especially exhaust valves, which have had to be changed frequently as a result of wear. Possibly with more experience and careful workmanship this will be overcome. In one instance, again, the deposit of lubricating oil on the piston rings had the effect of increasing the leakage of gas into the engine room, although this was not to any extent serious. The shipowners who have fitted oil engines are in most cases satisfied with the result, perhaps the best indication being that the East Asiatic Oil Company are now fitting most of their new ships with oil engines, and are, indeed, taking out comparatively new steam machinery and substituting internal-combustion engines. One advantage of the system is that, in view of the lower oil consumption, it is possible to carry oil for a voyage practically round the world, and, as a consequence, the ships need renew their oil supply only at the port where the price is lowest. In this way the economy stated in terms of cost of fuel is satisfactory. On the basis of a 13,500-mile voyage, the amount of oil consumed in a 1600 B.H.P. ship is given as 430 tons for the whole voyage; of coal for quadruple expansion engines of corresponding power 1500 tons, and of coal for triple expansion engines 1755 tons. There is a gain of 15 per cent. in the carrying capacity on the round voyage over that

possible where quadruple expansion engines are fitted, and of 18 per cent. over that where triple expansion engines are used. The wage saving is put at £50 per month, since, although the same number of watch-keeping engineers are required, six greasers serve in the oil-engined ship instead of the sixteen firemen and trimmers in the vessel fitted with steam machinery. The experience of the Marquis of Graham, in very carefully conducted trials on his motor yacht Mairi with semi-Diesel-Beardmore engines, was that the cost for a twenty-four hours' run with oil, costing at Glasgow 52*s.* per ton, was £8 6*s.*; with a steamship of the same displacement the cost, with Welsh coal at 20*s.* a ton, would be £12 8*s.*; with Scotch coal, at 14*s.* per ton, £8 19*s.*

Results with typical oil, steam, and geared turbine machinery.

Perhaps the most interesting comparison of the possible results of the internal-combustion engine with those of the reciprocating engine and geared turbines was brought out in a long discussion at the North-East Coast Institution of Engineers and Shipbuilders, where an attempt was made by experienced engineers to lay down the initial cost, the running charges, and the general results of fitting these three types of machinery to typical cargo vessels, 4655 tons gross and 2930 tons net register, a radius of action of 3500 nautical miles, a capacity for 7880 tons of freight-paying cargo, and an average sea-speed of 10½ knots. This required 2400 I.H.P. in the case of triple-expansion engines, 2150 S.H.P. in the case of the geared turbines, and 2150 B.H.P. in the case of the Diesel engines. As regards capital value, the steamship, a single screw vessel, cost £63,000 without superheaters, which would add £2000. The Diesel-engine ship, with twin engines and propellers, was estimated to cost £78,000; and the ship with turbines £64,000, the superheaters again costing £2000 additional. It was estimated that the triple-expansion engine, using superheated steam, would require 480 tons of coal for a 3500-mile voyage, the geared turbine ship, using superheated steam, 375 tons of coal, and the Diesel engine from 167 to 176 tons of oil. The difference in the weight of fuel carried enabled the tonnage of cargo to be greater in the ships with geared turbines and with Diesel engines, so that the capital cost per ton of freight-earning cargo worked out at £8 13*s.* for the reciprocating-engined ship, £9 1*s.* for the Diesel-engined ship, and £8 0*s.* 5*d.* for the geared-turbined ship, superheated steam being used in the triple-expansion engines and the turbines. On a conservative basis it was assumed that the fuel consumption per day for the Diesel-engined ship was 11·3 tons of oil; for the geared-turbined ship, using superheated steam, 27·2 tons of coal, and for the triple-expansion engined ship, also using superheated steam, 34·5 tons of coal or, with saturated steam, 42 tons.

These, it must be stated, are estimates merely, although based on a careful consideration of the work done by existing ships.

Progress in the use of oil engines with large-powered cylinders is, however, slow. No merchant ship at present in service is provided with a cylinder giving more than 300 B.H.P., and, so far as is known, no higher power engine is being constructed except for experimental purposes. There are several oil engines of the horizontal type in use in land stations with cylinders each of 1000 H.P., and the old controversy may be revived as to the relative advantages and disadvantages of horizontal and vertical engines for warships. With broader beamed ships and plenty of fore and aft room, owing to the absence of boilers, it may be that more can be said in favour of the horizontal engine than was the case twenty years ago, when it was discontinued in all Navy ships.

Size of oil-engine cylinders.

Vertical cylinders of 1000 and more H.P., tried experimentally in various countries, have not so far yielded completely satisfactory results. Experiments are being made with single-cylinder engines in this country, France, Germany, and Switzerland. Three of these engines are of 2000 H.P.; the others are engines of about 1000 H.P. The difficulties are associated with the rapid alternations of high temperatures and the consequent "punishment" of the metal used in the cylinders and the cylinder heads, owing to expansion and contraction. The problem set for the metallurgical chemist is, in view of this, a very difficult one, and explains why 1000 and 2000 H.P. cylinders have not so far worked continuously with absolute reliability when steam cylinders of 4500 H.P. have been in use at sea for years with satisfactory results. Most of the mechanical problems have been overcome, and there is every prospect that the metallurgical chemist will devise metals which will stand the stresses due to high temperatures. The cause of the trouble is due not simply to the heat, but to the heat being on one side of the metal of the cylinder and the cooling water on the other. The aim must ever be to minimise the volume of the combustion chamber or cylinder in relation to the surface absorbing the heat. If the best is to be got out of a cylinder of given diameter and weight, not only the two-stroke cycle but the double-acting principle must sooner or later be resorted to. This problem, however, has been dealt with in previous issues of the *Naval Annual*, so that nothing need be said regarding the matter here.

Large experimental cylinders.

The British Admiralty have adopted a very prudent course in ordering internal combustion engines for the propulsion of six oil-carrying steamers for supplying fuel to the Fleet. These ships vary downwards in length from 460 ft. and in capacity from 8000 tons.

British naval oil ships with oil engines.

The largest is the Olympia, being built at the Vickers works in Barrow-in-Furness, and the same firm will supply machinery for another being built in the Pembroke Dockyard—the Trefoil. Of the four other vessels, the Attendant and the Servitor are being built at Chatham, and the Carol and the Ferrol at Devonport. The machinery for the largest ship will be of 2500 B.H.P., and for the others it will vary between 1500 and 450 B.H.P. The power per cylinder in no case exceeds 160 H.P., and the weight for the complete installation works out at about 400 lb. per B.H.P., but no attempt has been made to ensure lightness. Different types of engines are to be supplied, the contracting firms, in addition to Messrs. Vickers, being the Fairfield Shipbuilding and Engineering Co. Ltd., of Glasgow, Scotts' Shipbuilding and Engineering Co. Ltd., of Greenock, and Messrs. J. Samuel White and Co. Ltd., of East Cowes. One of the sets at least will be on the four-stroke cycle principle, the others will be two-stroke cycle engines. They will run at from 140 to 200 revolutions a minute. Opportunity will also be afforded of testing in practical service various designs of valve gear. The system of driving the auxiliary machinery will be different in each case, steam, compressed air, and electricity being adopted in one or other instance, and data will be accumulated as to the economy, convenience and reliability of each application. The result will be that a large amount of information will be obtainable, and this, in association with the data being accumulated in the tests of the large experimental single-cylinder engine, will enable the engineering authorities at Whitehall to take future action with confidence.

Design of oil engines for battleship.

Some consideration as to an installation of internal combustion machinery for driving a battleship may therefore be justified. For the purposes of comparison with the details already given of ordinary turbines, of geared turbines, and of turbines with hydraulic transmission for a 75,000 H.P. warship, data have been got from several of the firms engaged in the construction of internal combustion machinery in this country and on the Continent. A four-shaft arrangement is proposed, each shaft having a series of fourteen cylinders, each capable of developing 1350 B.H.P., making a total of fifty-six cylinders. Remembering that most steam engines have only four cylinders on each shaft, although these are of great size and take up much room, this number of oil cylinders may seem an obstacle to the adoption of the system, but it must be borne in mind that no boilers are required, and that consequently the space occupied by the steam generators is available for the extension of the machinery rooms. The arrangement would necessitate two

athwartship engine compartments, one with rows of cylinders on the two inner shafts, and the other with rows of cylinders on the two wing shafts, the auxiliary machinery in the former case being in the wings, and in the latter case in the centre of the ship. Even then the full width of the ship need not be absorbed, and there would be abundant space for safety water-tight compartments immediately inside the skin of the ship, if not also for magazines.

Auxiliaries in oil-engined battleships.

A large number of auxiliaries are required, but not nearly so many as with steam engines. In the case, for instance, of a 75,000-H P. oil engine installation, the number of such auxiliaries would be twenty-six, including six or eight electric generating sets, air compressors for charging the air reservoirs to be used in starting and manœuvring the main engines, and compressors for high-pressure air for the injection of oil into the cylinders. All of these compressors would naturally be driven by oil engines. The oil-driven electric generators, however, would supply current for the usual sanitary, fire, bilge and other pumps, and for such sundry duty as forced lubrication, while the steering gear could be worked by the same medium. Scavenging, air, lubricating and other pumps connected with the main machinery would be actuated by levers from the main engine crosshead corresponding to those used in connection with the driving of air pumps in steam engines.

Weight of oil engines and fuel for battleships.

This oil machinery itself is heavier than turbines driving the propeller direct or working through mechanical gearing or hydraulic transmitter, the ratio being practically double that possible with the first named alternative, but it must not be forgotten that, as the fuel consumption is only about ½ lb. per B.H.P. per hour, as compared with 1 lb. of oil in battleships with turbines driving direct on to the propellers, there is considerable gain in weight of machinery and fuel for the same radius of action, or a material increase in the radius of action for the same weight of machinery and fuel combined. On the former basis—that is, with the same radius of action—there is a reduction of between 1400 and 1500 tons in the weight of machinery and fuel combined, equal to 18 per cent. to 19 per cent., or on the latter basis—*i.e.*, with the same weight of machinery—there is possible an increase of 50 per cent. in the radius of action at full speed and of 80 per cent. in the radius of action at half speed. As regards the space occupied, the two oil-engine rooms would take something like 240 ft. of the length of the ship, but not by any means the full width of the ship. In other words, the reduction in cubical space for the oil installation would be from 18 per cent. to 22 per cent., according to the various designs. As regards cost, the oil-engined battleship would probably come out higher, but to a very small extent.

Advantages of oil engines for battleship.

In addition to the reduced engine-room complement and the possible saving in fuel, there are several considerations, all of which have been fully discussed in previous issues of the *Naval Annual;* but they may here be briefly enumerated, namely, (1) the absence of funnels and smoke; (2) the ease, and short period of time involved, in starting the machinery from cold; (3) accommodation of liquid fuel in the double bottom, reserving the full width of the ship for other purposes, or, conversely, the fitting of oil tanks under the water-line, ensuring, in the event of collision or damage to the hull, the great advantage of a ship within a ship; (4) the multiplication of units, owing to the greater number of cylinders, reducing the risk of complete disablement due to any one part of the machinery giving way; (5) the absence of steam pipes and of the injury possible owing to their bursting; and (6) the possibility of securing the same power for going astern as for going ahead.

Steam generation without funnels.

It is possible, however, that the advantage of no funnels may, without superseding the steam turbine, be achieved by the adoption of boilers working with surface combustion. The principle of surface combustion is old, but the first engineer who has worked with it in modern times seems to have been Mr. Fletcher, of Warrington, who made some remarkable experiments in 1882. He showed that if a stream of air and gas were directed on to a mass of hot iron, for example, flameless combustion would ensue at the surface of the metal, which was rapidly melted by the high temperature attained. At the date of Mr. Fletcher's experiments, the theory of combustion and of radiation was somewhat imperfectly known, and his remarkable experiments led to no practical results. Subsequently the matter was reinvestigated by Professor A. W. Bone, in consequence of certain theoretical and experimental researches, and, in conjunction with Mr. McCourt, he succeeded in obtaining on a commercial scale some remarkable results. Of these, those bearing on boilers alone have an interest here.

Surface combustion boiler.

The Bone-Court boiler resembles in form the old Scotch marine boiler, but differs from it in being only some 3 ft. to 4 ft. long, and in having somewhat larger tubes and no furnaces. Each tube in fact is itself a furnace. It is filled near the mouth with a plug of fireclay about 6 in. long, which has a central tube about 1 in. in diameter. The remainder of the tube is packed with broken firebrick of a highly refractory character. Through the central hole in the fireclay a mixture of air and gas is fed in at so high a velocity that it cannot light back. This burns on the surface of the broken firebrick, and as soon as the temperature of this is raised sufficiently all flame disappears, and flameless surface combustion supervenes.

When this condition is attained, the whole of the surface combustion is completed within a distance of some 6 in. from the inner end of the fireclay plug. The broken firebrick in this neighbourhood attains an extremely high temperature, and radiates its heat at an astonishingly high rate into the neighbouring wall of the tube. The heat transfer in this region is so great that the rate of evaporation hereabouts rises to some 70 lb. per sq. ft. per hour. Since, however, this region of high evaporative activity is well away from the tube plate, no trouble arises at the joint, where the temperature never exceeds that of the surrounding water. As stated, combustion is completed within some 6 in. from the inner end of the fireclay plug, and the hot gases then escape through the interstices of the rest of the broken firebrick. This ensures that they shall have a very turbulent motion, and transfer most of their heat to the tube surface before they finally escape, which they do at a temperature only some 120 deg. F. higher than that of the steam inside the boiler. They then pass through a feed-heater, consisting simply of tubes surrounded by water and packed with broken firebrick, with the result that they are ultimately carried into the uptake at a temperature of less than 212 deg. F.

Possibilities of surface combustion.

For the present, it is true that boilers of this type have only been operated commercially with gaseous fuel, but it is understood that experimental work with oil fuel has proved promising. Data as to these experiments with oil are, however, withheld for the present, and it is only possible to give here the results obtained with gaseous fuel. With this fuel efficiencies of over 90 per cent. have been recorded with a rate of evaporation of 20 lb. per square foot per hour. The best efficiency realized with coal-fired boilers in similar conditions, but a very much lower rate of evaporation, is a little over 82 per cent. A test of a Lancashire boiler and economiser gave an efficiency of 81·5 per cent. If, therefore, the surface combustion principle can be successfully adopted at sea, there would appear to be a possibility of saving some 10 per cent. in the fuel consumption per H.P. hour. At the same time, there would be a large reduction in the boiler-room weights. The best figure for water-tube boilers is given as 490 lb. of steam per hour per ton of boiler-room weights. The first of the surface combustion boilers, erected at the Skinningrove Ironworks, generated about 680 lb. of steam per hour per ton of total weights (water included), the rate of evaporation being 20 lb. per hour per sq. ft. of heating surface. The efficiency, after allowing for the power absorbed by the fans, was over 90 per cent. The rate of steaming, it is claimed, can be increased 50 per cent., without any sensible decrease in the boiler efficiency, though a

somewhat larger deduction would be required for the extra power taken by the fans. Allowing for this, however, the net over-all efficiency would still, it is contended, not be below 90 per cent. In this case the weight of steam generated per ton of boiler-room weight would, on the Skinningrove figures, be about 1000 lb. per hour.

Even allowing for the substantial increase of weight which would be necessary to provide for the high working pressures used in the Navy, it will be obvious that the possibilities of the surface combustion boiler are worth careful investigation and extended experiment. It has, moreover, to be borne in mind that the output of 20 lb. of steam per hour per sq. ft. of heating surface is by no means the highest rate possible, as in some experiments this figure was raised to no less than 56 lb. of steam per hour per sq. ft. of heating surface. The efficiency was correspondingly reduced, but probably did not fall below the figure now common in the Service. In the case of a U.S. torpedo-boat destroyer, fitted with Normand boilers, the boiler efficiency at full power varied from about 53 per cent. up to about 64 per cent., the maximum rate of evaporation (from and at 212 deg. F.) being 12½ lb. per sq. ft. of heating surface per hour. It may be added that, since the surface combustion boilers are worked under a forced draught of some 17 in. to 20 in. of water, it may perhaps be practicable to dispense with funnels.

Reduction in weight of machinery for destroyers.

Before referring to the possibilities of adapting different systems of machinery for the propulsion of torpedo-boat destroyers, some data as to the development of machinery for this type of vessel may be indicated, particularly as regards weight. Ten years ago, when these vessels were driven by reciprocating machinery and coal-fired boilers, the weight of the whole installation, including water in the boilers and spare gear, was between 58 lb. and 62 lb. per I.H.P. developed. When turbine machinery was introduced, with coal-fired boilers, there was a marked reduction, the corresponding figure being 50 lb. to 52 lb. Later, when oil-fired boilers were adopted in association with turbine machinery, using ordinary saturated steam, the figure was reduced to 33 lb., and the weight has since been reduced to 30 lb. by the adoption of even quite a moderate degree of superheat. These later results are with turbines driving direct on to the propeller shaft.

Geared turbines in destroyers.

As regards the introduction into destroyers of some form of the speed reduction appliances already discussed in connection with battleship machinery, the value, from the point of view of propelling efficiency, would not be as great as with battleships. The weight of the turbine machinery in destroyers is, as we have already indicated, very satisfactory. An electric generator driven by the

turbine, with a motor for driving the shaft in the electric system, would probably involve a higher displacement for the ship, which would most likely more than counterbalance any advantage gained in propeller efficiency; indeed, this applies more or less to any form of reduction gear. The Admiralty are carefully collecting data from service steaming as to the efficiency of helical gear applied to the Badger and Beaver, and Sir Charles Parsons has proposed a design of machinery for a destroyer with gearing for all the turbines. In this design two shafts are proposed, as in later high-power destroyers. The installation consists of a high-pressure and a low-pressure turbine on each shaft, and an additional cruising turbine geared with one of the shafts for use at low speeds. This arrangement will ensure an improvement in economy, as compared with the usual design of direct coupled turbines, of about 10 per cent. at full power, and of 25 per cent. to 30 per cent. at cruising power; were steam superheated to the extent of 50 degrees, there would be an additional saving in steam consumption of 5 per cent. or for 100 degrees of superheat a saving of 10 per cent.

Hydraulic transmission in destroyers.

The only proposal so far made in this country in connection with the Föttinger gear is the application of such a transmitter in the two Japanese destroyers being built by Messrs. Yarrow. These destroyers are to be similar to the Firedrake, Lurcher, and Oak, with which a speed of over 35 knots was attained on trial; but an internal combustion engine with Föttinger transmitter is to be fitted for driving the ship at cruising speed.

In last year's issue of the *Naval Annual*, a description was given of a system of oil engines for cruising speed, to be fitted by Messrs. Thornycroft to a British torpedo-boat destroyer. The oil engines for cruising purposes in this ship have not yet been fitted on board, although the vessel has been some time in service. The Yarrow installation differs, however, firstly, in having the transmission gear between the oil engine and shaft, and, secondly, in having a hollow spindle on the turbine and a clutch abaft the turbine, so that the turbine will be disconnected when the vessel is run at cruising speed by the Diesel engines. Messrs. Yarrow are using a non-reversible 4-stroke cycle Diesel engine, so that the engine will be lighter and less complex; it will run continuously in one direction and at a more uniform speed than would be possible were no transmitter interposed between the engine and propeller. Stopping, starting, or reversing can be entirely achieved by the transmitter, and in its action in all these respects it is as immediate as the steam turbine. There is possible also a very great range in the number of revolutions by the propeller. The space occupied by

this Diesel engine and transmitter will necessitate an increase in the length of the vessel, while at the same time the weight of the machinery installation will be increased by about 85 tons, equal to nearly 25 per cent. The adoption of the internal combustion machinery for cruising purposes reduces the maximum speed obtainable by one or two miles per hour, but enormously increases the radius of action at cruising speed. It is a question for naval officers to decide whether they would prefer the radius of action increased two or three times with a given fuel supply, or have the highest maximum speed possible with smaller radius of action. The radius possible with high-speed destroyers at the present time is about 700 sea miles at 35 knots and 2000 sea miles at half speed.

Weight of oil engines suitable for destroyers.

In regard to the possibilities of fitting internal-combustion engines to destroyers, it is suggestive that there has been a steady increase in the estimates of weight of high-speed engines. At the beginning of 1911 enquiries for an installation of light, high-speed machinery brought a proposal involving a weight of 35 lb. per B.H.P. This by the autumn had increased to nearly 50 lb., whereas at the beginning of this year the estimate was 65 lb., the only cause apparent being the insistence on the part of possible clients of a satisfactory measure of reliability. The latest estimate by leading builders of high-speed Diesel engines on the Continent is 120 lb. per B.H.P. It would seem from the result of such enquiries that Diesel engines suitable for destroyers would involve a weight of from 90 lb. to 100 lb. per B.H.P., or three times that of turbines and oil-fired boilers in some of the latest successful destroyers. Thus, in a destroyer where the H.P. is 22,000, the weight of machinery, instead of being only about 300 tons, would be over 1000 tons, with the result that the displacement of the ship would be enormously increased and a speed of 32 knots made practically impossible.

Space occupied by destroyers' oil engines.

With reference to the space occupied by Diesel engines, it is assumed from the dimensions of existing smaller engines that an installation of cylinders giving in all 21,000 H.P., equally distributed in three sets for a triple-screw ship, would require an engine room 206 ft. long. If it were possible to get four shafts in the width of the ship the length of the machinery space would be 150 ft. long, which compares with 110 ft. to 115 ft. in existing turbine-driven destroyers. With the present beam of destroyers it is not practicable to get in four lines of shaft with the engines side by side in the same athwartship compartment. In any case the machinery space would not be less than with turbines, notwithstanding the absence of boilers.

Fuel consumption.

In regard to the fuel consumption, the rate achieved in some of the later destroyers using superheated steam is not over 1 lb. per

S.H.P. per hour at full speed, and, in some instances, where there was not the same attempt to get high evaporation from the boilers the rate has been less. In the case of the Diesel engine the estimates vary considerably, but 0·46 lb. per B.H.P. for the main engines only is accepted as a fair result. The oil required for working the dynamos and other auxiliaries would increase this figure at full speed by 3 per cent. and at the cruising speed by 7 per cent. The consumption would, in Diesel-engined ships, be one-half that in destroyers with steam turbines, but, including fuel for a normal radius of action, the relative weights would be 1050 tons for oil engines and 400 tons for oil-fired superheating boilers and turbines.

Reciprocating *v.* oil-turbine engines. It is undoubted that the internal-combustion engine is a remarkably efficient device for the conversion of the heat energy of fuel into useful mechanical work, and it may fairly be asked why so much effort is being expended in the attempt to replace the highly efficient reciprocating oil engine by an oil turbine, for which even the most sanguine of inventors do not anticipate other than an increase in the fuel consumption per effective H.P. The reply to this question is that while the reciprocating engine is naturally fitted for moderate powers, it is inherently unsuitable for large powers. In fact, no direct driven turbine launch could be built to compete in speed and endurance with the petrol type, although geared turbines might be employed in such craft. But on the other hand no internal-combustion-engined destroyer could compete successfully with the steam turbine-driven type, and the advantage of the latter augments with every increase in the power demanded. A large output from internal-combustion engines involves in practice the adoption of cylinders of large diameter and, other things being equal, the weight of a reciprocating engine per effective H.P. is directly proportional to the cylinder diameter. Hence an engine with a 20-in. cylinder, though it would have an output sixteen times as great as a similar engine with 5-in. cylinders, would weigh sixty-four times as much. Thus, while in a launch the total machinery weight needed with petrol is very substantially less than would be required with a steam turbine plant, the weight increases so rapidly with the amount of power developed that the engine weight alone of an internal combustion set soon exceeds the combined weight of a set of steam turbines and its boilers. The 10,000 H.P. machinery required in cruisers could not, if developed by Diesel engines, be put on board without a substantial increase of the displacement.

Centrifugal and inertia stresses. Another factor in the problem lies in the difficulty of getting steel in large masses of the same high quality as is readily secured with smaller sizes. High speeds of rotation involve heavy centrifugal

and inertia stresses. In the case of turbines such stresses are remarkably steady in character, whilst in the case of reciprocating engines the inertia stresses alternate between tension and compression. A varying strain of this type is much more dangerous than a steady stress of the same maximum intensity. Several serious accidents occurred in the old days of engine-driven destroyers through the fracture of connecting rods by these inertia stresses. This point was, a few years ago, strongly emphasised by Mr. Carnt, who compared the freedom from worry which was characteristic of the trials of the turbine-driven destroyers with the anxieties invariably associated with the full-power trials of earlier boats fitted with reciprocating machinery. With these one could never be quite certain until the trials were over that some hidden flaw in the metal might not lead to a catastrophe.

Possibilities of oil and gas turbines.

In view of the above, there is no reason for surprise that engineers should be anxious to associate the mechanical advantages of the steam turbine with the high thermo-dynamic efficiency of the internal-combustion engine, and that they attach so much weight to the former consideration that they would be ready to adopt an oil turbine, even should it be materially less economical in fuel than its reciprocating rival. Many experimental gas turbines have accordingly been constructed, both in this country and abroad. Little has been heard about those which have been tried here, since our own engineers have generally preferred to say nothing about experiments which have proved abortive. Almost every conceivable working cycle has been tested here pretty thoroughly, and the results have been uniformly disappointing. One of the difficulties in the way of the experimenter lies in the fact that the turbine is not well adapted for use in small units. In steam turbine practice a turbine of 300 H.P. has often shown not more than one-half the efficiency of a similar type of turbine ten times as large, and there is no reason to believe that a different rule would apply in the case of the gas turbine. This fact makes experimenting very expensive, but the cost has been faced both here and abroad.

British experiments with gas turbines.

The most promising system tried here was one in which the regenerative system was largely employed, the spent gases from the turbine being used to heat up the incoming air and gas. The difficulty apprehended from high temperatures was partially met by the adoption of nozzles lined with carborundum, which, being a product of the electric furnace, is extraordinarily refractory. Ultimately, however, the experiment was abandoned. Theory showed that, were it possible to compress the gases efficiently, a fair economy might have been obtained. In the ordinary reciprocating gas-engine

the efficiency of the compression is of the order of 98 per cent. In the case of a gas turbine, however, it is essential, for practical reasons, to use a compressor of the turbine type, and the highest efficiency realised by these does not exceed some 65 per cent. Even this figure is open to some doubt owing to the method by which it was obtained.

Continental experiments with gas turbines.

It was mainly this difficulty with the compressor which rendered abortive the fine experimental gas turbine due to Mr. Armengaud. Another solution of the problem has been attempted by Mr. H. Holzworth, who described, in a paper read before the Schiffsbautechnische Gesellschaft, a gas turbine designed to develop 1000 H.P., which was built for him by Messrs. Brown, Boveri & Co. Actually this turbine never succeeded in generating more than a small fraction of its nominal output, and, as was pointed out in *Engineering* at the time, the maximum efficiency probable on this cycle is not more than about 11 per cent. This view, it may be added, was endorsed by Mr. Dugald Clerk in his paper read at the Dundee meeting of the British Association in 1912.

No doubt that class of the community sometimes known as x chasers will continue to demonstrate on paper the tremendous possibilities of this or that working cycle, but those whose knowledge of elastic fluid turbines is most complete are the least sanguine as to the practicability of an internal combustion turbine. It appears safe to predict that should success be ultimately attained, the solution will prove to have been discovered along paths not yet traversed by those who have discussed the subject from the theoretical standpoint.

Financial considerations in machinery design.

Apart altogether from the mechanical and tactical questions associated with the design of propelling machinery, there must ever be the financial consideration. This presents itself in connection with the use of oil fuel, either in the boilers or in the engine cylinder itself. The efficiency of the warship as a fighting element must, however, be paramount. The Admiralty have in their constructional policy accepted the benefits accruing from the higher calorific value of oil fuel. The destroyers and lighter craft depend entirely on this fuel, and all recent ships use it at least partially, while some of the vessels now building have their boilers designed for using it exclusively. There is no question that, as a consequence, the weight of machinery is lessened considerably, the *personnel* is reduced, and the ability to maintain high speed for a prolonged period is improved.

Price of oil.

A great augmentation of the price of oil fuel has, however, a disturbing effect on those responsible for financing the Navy, but it would be imprudent to jeopardise the efficiency of any ship in the

hour of emergency by paying too much heed to this financial consideration. This is especially so when it is borne in mind that the present circumstances of the oil industry, and particularly the carrying trade, are abnormal. The sudden increase in the demand for oil was not fully anticipated by those responsible for its transport, and consequently higher freights were exacted because the demand for tonnage so enormously exceeded the supply of tank steamers. Three years ago the cost of transport from the ports of the Northern States of America to Europe was about 10*s*. per ton; it has since been as high as 70*s*. per ton. At the present time there are nearly 100 vessels of the oil-carrying type in process of construction, their aggregate tonnage being 500,000 tons. The consequence may be a more reasonable rate for the transport of oil in bulk and a possible reduction in the selling price. But even so there is grave doubt about the price being reduced to a satisfactory figure as compared with coal.

Use of oil residues.

It is being more fully realised also that the Diesel engine should be so constructed as to utilise those qualities of oil which are available in the largest quantities, namely, the residues from distillation after removal of the light products. Such residues form about two-thirds of the world's total production of petroleum, or at the present time about 29 million tons. These residues, it is true, vary considerably in quality—that is to say, in specific gravity, in viscosity, and in chemical constitution—but engine builders are studying the problem of modifying design to enable them to be used. The points of supply are fairly distributed over the world. The mechanical difficulty in the use of these residues is that the cylinder requires regularly to be cleansed from the accumulation of unconsumed oil, and this, at sea, is not practicable. The cleansing is necessitated by the presence of heavy particles due to asphalte. The presence of a small percentage of sulphur in such oil is not a great disadvantage, so long as the water vapour of the exhaust gas is not allowed to condense. The asphalte difficulty, it is anticipated, will not be serious if the air contents of the cylinder be compressed to over 500 lb. per sq. in. before the injection of the oil, and if a certain quantity of light oil enters the cylinder in advance of the heavier residual oil. The difference in heat values between petroleum oils and the vast petroleum residues does not exceed about 5 per cent.

Use of oil distilled from coal.

The conditions conducive to the combustion of the heavier residue oils may also ultimately enable tar oils distilled from coal to be used, and Dr. Diesel himself has pointed out that as "tar and tar oils are from three to five times better utilized in the Diesel engine than coal in the steam engine, a much better and more economical utilization

of coal is obtained if, instead of being burned under grates in a wasteful way, it is first transformed into coke and tar by distillation." This offers a possible answer to the arguments against Britain being to any extent dependent on oil—a foreign product—when there exists so plentiful a supply of coal. The mechanical difficulty of distilling oil from coal has reference to the friable nature of the coke produced. Moreover, pessimists incline to the view that with the increase in the production of sulphate of ammonia and other residuals, as a result of the distillation of oil from coal commercially, their value would so decrease that the production from coal of tar oil suitable for Diesel engines would not be so attractive financially as appears under present market conditions. There is no difficulty, however, in securing the best result in respect of oil while getting satisfactory coke and other profitable by-products.

Advantages of research work.

It is well, in concluding, to say again, as at the outset, that the proposals for different types of machinery, alike for battleships and destroyers, are necessarily speculative, but in view of the intense interest taken in the mechanical, metallurgical, and chemical problems involved, and the undoubted advantage which must accrue in respect of the efficiency of warships with a reduction in the weight of machinery and in the fuel for a given radius of action, the particulars given are worthy of consideration. They may help to focus attention on possible developments and stimulate that research and experiment which is essential in every department of scientific work. It is, indeed, a hopeful sign that so much attention is being devoted to the development of the mechanism for producing power, whether for warships or for manufactures and transport. Without this original work progress would be slow, and as the most clamant need in connection with propelling machinery is for naval purposes, there is afforded once more a convincing proof that in the development of war appliances stimulation is given to the general progress of the race.

ALEX. RICHARDSON.

CHAPTER V.

The Principles Governing the Use of Armour and Guns in Ships of the Line.

The Memorandum on Naval Defence Requirements prepared by the Admiralty for the Government of Canada, and laid before Parliament in December, 1912 (Cd. 6513), recommends that any aid given to the Dominion "should include the provision of a certain number of the largest and strongest ships of war which science can build or money supply." These words sum up the doctrine on which rests the shipbuilding policy of this country. What do they mean ?

The Cunard liner Mauretania, launched in 1907, is 760 ft. long, 88 ft. broad, and weighs 39,000 tons at a draught of 34 ft.; the White Star liner Olympic, launched in 1911, measures 850 ft. in length, 92 ft. in breadth, and displaces 52,000 tons at the same draught. Still larger ships are being built. Thus the largest warship which science can build, or money supply, may well approach 60,000 tons, or nearly twice the displacement (32,000 tons) of the largest warships now on the stocks. Warships are shorter and broader than merchant ships of the same displacement, in order that they may be given the stability considered necessary to enable them to carry heavy weights of guns and armour high up in the ships. Thus the so-called battle-cruiser Lion has the same beam as the Mauretania, although her displacement is some 10,000 tons less. Again, the more recent ships, *e.g.*, the American Pennsylvania and Nevada, and the German Kaiser and Weissenburg, are nearly 100 ft. broad. New docks are being given a width of 150 ft., as against 100 ft. in those already existing. Hence we may infer that a large increase in size is held to be probable in the near future.

The meaning to be attached to the word "strongest" is more difficult to state in concrete terms, and is in fact a much disputed point owing to want of precision in thought and language, to imperfect knowledge of facts, and to lack of war experience. The following

table gives the leading facts relating to certain typical ships of the line, so far as they have been published.

Name.	Designed displacement.	Designed speed.	Guns fought on one side.	Thickness of Armour.	
				On sides.	On primary gun positions.
	tons.	knots.		inches.	inches.
Dreadnought	17,900	21	8 12-in.* .	11, 8, 6, 4	11, 8
Invincible	17,250	25	6 (8 ?) 12-in.*	6, 4	7
Orion	22,500	21	10 13·5-in.†.	12, 9¾ and ?	12, 8
Lion	26,400	28	8 13·5-in.† .	9¾, 7 and ?	10
Queen Elizabeth . . .	29,000	25	8 15-in. . . 8 6-in. . .	Thicker than in Orion,	
Tiger	30,000	31	8 13·5-in. . 8 6-in. . .	Thicker than in Lion,	
Almirante Cochrane . .	28,000	22	10 14-in.. . 8 6-in. . .	11, 8, 6	11
Rio de Janeiro	27,500	22	14 12-in.. . 10 6-in. . .	9, 6, 4	9

* 12-pdr. omitted. † 4-in. guns omitted.

The first point to note is that different values are attached to armour, speed, and guns, and that in consequence the ships named fall naturally into three groups:—

First group.	*Second group.*	*Third group.*
Dreadnought	Invincible	Rio de Janeiro
Orion	Lion	
Queen Elizabeth	Tiger	
Almirante Cochrane		

The distinguishing mark, or characteristic, of the first group is armour, of the second speed, and of the third guns. The higher speed of the second group is obtained by a partial sacrifice of both guns and armour. The larger number of guns carried by the third group is due to a return to a smaller calibre—12 in.—and possibly to some decrease in the percentage of displacement given to armour.

The second point is the great growth in size during the past seven years. When fully loaded, the ships named are three or more feet deeper than their designed draughts. Hence their designed displacements are 2500 tons or more smaller than the true ones, but they serve to show an increase in displacement of upwards of 60 per cent., which seems to be due to placing all the primary guns on the centre line, to the increase in the size of guns, to the return to the secondary armament, to the increase in the thickness of the armour, and perhaps to some addition to the speed. As has been recognised for nearly a generation, and cannot be doubted, military advantage results from carrying all the primary guns on the centre-line and from the use of a secondary battery. But what the number of primary guns should

be, and whether it is wise to increase the size of those guns and the thickness of the armour, are open questions, about which opinions differ. We have to note that in ships now building, and not very different in size, the primary guns differ in calibre between 12 in. and 15 in., and in number between fourteen and eight; the armour varies in maximum thickness between 13½ in. and 9 in., and the designed speed between 31 knots and 22 knots. Since these ships are all "of the line," such great differences are remarkable, and indicate an absence of any accepted principles on which to base their military qualities.

The gun armament raises two questions:—

1. Shall one or two natures of guns be mounted?
2. What shall be the numbers and sizes of those guns?

We have already shown * at length that the need to be prepared to fight at any range makes it expedient to mount two natures of guns—primary guns of comparatively large size and long range, to prevent being out-ranged at long distances, and secondary guns of comparatively small size to increase the volume of fire producible by a given weight of armament at decisive ranges. The 6-in. guns in the Iron Duke class mark a return to the old and well tried two natures of gun principle.

For a given weight of armament, the numbers of guns carried must evidently vary inversely with their sizes. Both numbers and sizes are important. Numbers are required because shooting at sea is very inaccurate, and many rounds must be fired to produce the hits necessary to defeat a ship. In no action during the Russo-Japanese war did the hits amount to more than about 6 or 7 per cent. of the rounds fired, except perhaps in the battle of Tsu Shima, as to which the facts are wanting. From the results of that war it has been estimated that 100 hits from the 12-in. and other guns then in use are required to put a ship of the line out of action, which gives some idea of the number of rounds required to ensure victory. No doubt since that date great attention has been paid to improving the shooting, but the arrangements are very complex, artificial, and far from perfect, require great skill to carry out, and can be disorganised by the enemy's fire. Not only may such centralised arrangements fail in battle, and more especially at "decisive" ranges, but such improvement as may have been attained will be more than counterbalanced if ships, as now fitted, fight actions at longer, or rapidly changing, ranges. The peace practices differ so much from war conditions that, unless carefully discounted by experienced men

* See "The Ship of the Line in Battle," pp. 2, 3—Blackwood.

with well-balanced minds, they are very misleading, and give too high an estimate of the accuracy of fire in battle.

The sizes of the guns depend on the work to be done, which is to defeat the enemy. Now an enemy is defeated as soon as he is *disarmed*—that is to say, as soon as his guns are silenced and his torpedoes cannot be fired, since he will then be helpless. Will an enemy be defeated more quickly by being disarmed directly by having his guns and torpedo tubes put out of action, or indirectly by being sunk? An examination of the actions fought in modern times has shown that, whether the ships were armoured or not, the guns have been reduced to silence and the enemy defeated before the ship foundered. No similar evidence is available as to the tubes, but being placed under water in ships of the line, they can only be put out of action by disabling the firing stations, which should not be more difficult than to disable guns. The evidence seems to show that the quickest way to defeat an enemy with the gun is to disarm him directly by putting his guns and tubes out of action rather than indirectly by sinking him.

What must be done to disarm an enemy? It is necessary to disable his *personnel*, to injure his guns and firing stations, and to disorganise his communications, which last increase in importance as the system becomes more centralised. Since the *personnel*, guns, and firing stations are scattered over a wide area, and are not to be found in many parts of the ship which may be struck by projectiles, we see why a large number of blows must be delivered. The necessary weight of these blows depends partly on the estimate of the effect produced by bursting shell and partly on the thickness and distribution of the armour, with which all ships of the line are very imperfectly protected. The effect produced by the explosion of shells differing in size has been estimated both from peace experiments and from results obtained in actual battle. Peace experiments have been found to be misleading, because the shell is made to explode exactly on the desired spot, and its effect has usually been exaggerated by the experts, whose minds are often warped by pre-conceived ideas. Battle shows not only the difficulty in hitting the right spot but that to do so is more important than to hit with a heavy shell. The war facts also indicate, that if the object in battle is to disarm the enemy, the effect produced by a shell is by no means proportional to its weight. Men cannot be more than killed, neither can guns be more than disabled, to both of which small shell properly placed are quite equal. Hence the error of comparing the fighting power of ships by the total weights of their broadsides. What can be more misleading than to compare

the broadsides of the Orion and Rio de Janeiro in that way? The weights are 12,500 lb. and 12,900 lb. respectively, but the one will have ten effective guns in action against fourteen of the other at long ranges and twenty-four at decisive ones, which means that the "firing capacity" of the latter may be more than three times that of the former. These facts are concealed by comparing total weights.

Armour K.C.

	Unarmoured.	2″	7″	8″	9″	10″	11″
30·5 c.m. or 12 in. up to extreme ranges	. . . .		.	.	11000	9400	8000
15 c.m. or 6 in.	do. .			. Pr	oof	. .	. .
Percentage	60	12·8	2·4	6·5	4	5·5	8·8

The above diagram, which is drawn to scale, shows how imperfect is the armour protection, and represents the area of the whole vertical target exposed by a comparatively modern ship above the *designed* water-line, and including the flying deck and superstructure up to the level of the floor of the conning-tower. It is to be noted that at deep draught much of the 10-in. belt will be under water, and the protected area will be less than that shown. The parts of the barbettes inside the ship are not included, neither are the funnels nor the masts, nor is any allowance made for the deck area, which adds materially to the size of the target both at long ranges and in a rolling ship. On the diagram are marked in yards the ranges in battle at which the guns named can be reasonably assumed to drive shells charged with high explosive through armour of the thickness shown. It will be noted that the whole ship is perforable inside 8000 yards by 12-in. armour-piercing shell, and nearly three-fourths of her at longer ranges by 12-in. common shell and by 6-in. projectiles. The thick armour—9-in., 10-in., and 11-in.—is to be found on the primary gun positions and water-line, which present very small targets and are very difficult to hit, as war experience has shown. It follows that, at ranges at which it is likely to be struck, the whole of the armour is perforable, and thus loses much value. As the ship carries upwards of 5000 tons of armour and somewhat more than 3000 tons of guns, it is not unreasonable to ask whether it is quite certain that the full value is derived from that 5000 tons and the very large sum of money which it represents.

A different arrangement seems to have been made in the Rio de Janeiro, in which the armour appears to be reduced in thickness and to be spread over a larger area. The object may be to keep out shells with large bursters of high explosives fired from primary guns. This

policy does not seem to promise any real advantage or finality, since whatever be the thickness the appropriate shell will be used against it, and even an armour-piercing shell, with its comparatively small burster, is more than sufficient to kill the men and disable the guns at the place where it perforates.

In order to place the question on a more satisfactory footing, two proposals have been made, each of which embodies a definite principle. The one would make the armour proof only against the secondary guns at decisive ranges, the other would be satisfied if that on the gun positions were proof only against fragments of bursting shell, and that at the water-line were sufficient to limit the size of the holes made. The two would differ little in practical results. Both proposals recognise and accept the fact that armour cannot be made proof against primary guns at fighting ranges; the present received doctrine does not do so, and in consequence the existing shipbuilding policy tends to increase rather than to reduce the armour. Thicker plates (13½ in.) and larger guns (13·5 in. and 14 in.) are being introduced. The armour will remain equally, or even more, perforable, since that thickness can be perforated by those guns up to 10,000 yards. Thicker armour and still larger guns are about to be used, but the result will remain the same: the armour will still be perforable. The continual growth in the thickness of the armour and in the size of the guns must be accompanied either by a reduction in the number of guns and in the area protected, or by a great increase in the size of the ship. The former policy was tried about a generation since, and was abandoned because the resulting ships—*e.g.*, Inflexible of 1874—were found to be not formidable to their enemies owing to their deficient gun-fire. Nevertheless, it is again being proposed. The latter policy will tend to result in ships of extreme dimensions, say, of 60,000 tons or more, carrying double the present weight of armour, say, 15,000 tons, which will be perhaps 24 in. thick, and will cost more than £1,000,000 per ship. The guns may approach 20 in. in calibre, and with these the armour will still remain perforable.

Whatever armour is carried it will be admitted that the deciding factor is superior gun-fire, which is held to be ability to deliver a greater number of effective blows in a given time, and to involve bringing into action the largest number of the smallest guns that will do the work. As has been already explained, the work to be done is to disarm the enemy, which does not necessarily include perforating his thickest armour at all ranges.

The doctrine in favour, which may be called that of the one-calibre-single-blow, is quite opposed to this. It holds that superior

gun-fire consists in hitting with a relatively small number of the largest projectiles, in order not merely to disarm the enemy but to perforate his thickest armour at all ranges and to destroy his ship. It tends not to the smallest gun that will do the work but to the largest gun that can be built. This doctrine has been before the world upwards of forty years, has been tried in war, and has hitherto failed, whether with the ram, the Whitehead torpedo, or the gun. As originally stated, it maintained that a single blow from one of these would totally disable an enemy, but it did not take into account the difficulty in using these weapons in battles at sea—in hitting at all with the ram or Whitehead, when ships are in motion, or in hitting the right spot with the gun. Few men noted that the ram had only been used with success against ships at anchor or at rest. The experiments with the Whitehead were so arranged that it should explode exactly in the right place. The possibilities of not hitting at all, or not on a vital spot, and of the torpedo not exploding, if it did hit, were thus kept out of sight. The great majority of men took for granted that every Whitehead fired would hit and forthwith send a ship to the bottom. We know now how immensely wrong was that assumption, and how exaggerated was the value attached to the Whitehead.

The whole series of practice-ground experiments with guns were equally misleading. As the result of their teaching, men came to think that iron ships were unfit for the purposes of war, that armour was more important than gun-fire, and that no guns but the heaviest were of any value. These conclusions are now admitted to have been wrong. Some twenty odd years since the secondary battery was introduced, but in 1905 it was abandoned, and is now about to be re-introduced. In view of all these erroneous deductions from peace experiments, is it quite certain that it is right to attach so much importance to peace experiments with big shell and to increasing the calibre of the primary guns?

As has been pointed out, the received doctrine tends to arm ships with a small number of guns ever increasing in size and to the use of armour ever increasing in thickness and weight. It is believed to be based on exaggerated ideas, derived from peace practice and experiments, of the accuracy of gun-fire in battle, and of the effect produced by large bursting shell. The doctrine suggested would arm ships with a larger number of guns of two natures; some primary large ones of the smallest size consistent with not being out-ranged and with maintaining ascendancy over the armour, either by perforating it if spread out, or by overwhelming the ship and crew with repeated blows if concentrated; the others secondary guns throwing

shell between 100 lb. and 200 lb. in weight to increase the volume of fire. It would reduce the armour to a minimum by making the gun positions proof only against shell splinters and the water-line thick enough to prevent large holes being ripped in the sides. It would spread the risk by increasing the number of ships while keeping the size moderate.

It will be well to consider concrete cases. Compare the Dreadnought and Invincible ships of the line of about the same displacement and cost. The former is protected by 11-in., 8-in., 6-in. and 4-in. plates on the sides and by 11-in. and 8-in. armour on the primary gun positions; the latter carries 6-in. and 4-in. armour on the sides and 7-in. on the primary gun positions. But both ships present targets, the greater parts of which are unprotected. Inside 8000 yards the ships would be practically equal as far as protection is concerned, since the whole of the armour would be perforable by the 12-in. armour-piercing shell. Outside 8000 yards the Dreadnought would have some advantage in that parts of her primary gun positions and partial belt would be imperforable, but the advantage would be small, since the gun positions and belt, if the latter were above water, would each present such small targets that the probability of actually hitting either would be small, as has been proved by war experience. Now, both ships should desire to close to ensure hitting, and the Invincible especially would want to do so in order to put herself on an equality as to protection. Hence the thicker armour carried by the Dreadnought is held to be of no more value than the thinner armour of the Invincible, because both are equally perforable at probable fighting ranges. The saving of weight in armour in the Invincible amounted to about one-third of that given to it in the Dreadnought and might have been a clear gain, if properly utilised.

If the armaments are compared, we find that these ships did not carry:—

1. All their primary guns on the centre-line;
2. A secondary armament;

as did their predecessors, and as will the ships now building. In both ships great stress was laid on end-on fire, although it was well known to have much less value than broadside fire.

Owing to the tactically vicious *échelon* arrangement of her centre turrets, the Invincible can use eight guns on one side only through very limited arcs. The off turret may at any time be thrown out of action by small alterations of course and cannot be relied on. One-fifth of the weight of armament carried by the Dreadnought was sacrificed in the Invincible. The weight saved in armour and guns was used to increase the speed of the latter. If the weight allotted

to guns had been maintained instead of being reduced, or had even been increased by a portion of that saved on armour, the remainder being used to strengthen the hull and to increase the speed, the result would have been a ship at least equal in power to the Dreadnought, and more formidable, but of less speed than the Invincible. Why was gun power sacrificed in the Invincible? It is believed that the answer is to be found in the same faulty strategical and tactical ideals which produced the Russian ships defeated at Ulsan.

The same arguments apply to the Orion and Lion, as also to the Queen Elizabeth and Tiger. In all four ships the whole of the primary guns are in the centre line. In the last two the secondary armament is to be restored, and the primary guns of the Queen Elizabeth are to be further increased in size and the armour of both ships in thickness. In the Lion and Tiger there is a reduction both in guns and in armour to provide for an increase of speed. The reduction in armour represents no loss of fighting power, and might even be carried further, but the loss of guns is very serious and prepares defeat. How can it be expected that the 980 men in the 26,400-ton Lion, armed with only eight guns, could engage with success the 750 men in the 22,500-ton Orion, armed with ten guns of the same size? It is to be noted that the armour on both ships would be perforable and of equally little value.

Again, compare the Almirante Cochrane and Rio de Janeiro, ships of the line, of about the same displacement, and of equal speeds. The former is protected by 11-in., 8-in., and 6-in. plates on the sides and by 11-in. armour on the primary gun positions; the latter carries 9-in., 6-in., and 4-in. armour on the sides and 9-in. on the gun position. Inside 8000 yards the ships would be practically equal as far as protection is concerned, since all the armour in both ships would be perforable by the primary guns. Outside that range the Almirante Cochrane would have the same very small advantage as had the Dreadnought over the Invincible, but, as in their case, her thicker armour is held not to be worth the extra weight at probable fighting ranges. Is it worth while to carry armour perforable by the primary guns, and thicker than is required to keep out either splinters from bursting shell or the projectiles from secondary guns?

All the primary guns of both ships are on the centre line, and both carry a secondary armament. The Rio de Janeiro is armed with the greater number of both natures. Since her 12-in. guns seem to be large enough to do the work, the greater number carried should give her a clear advantage at decisive ranges and should balance any

superior accuracy in the 14-in. guns of the Almirante Cochrane at long distances. The first seems to be armed on more sound principles than the second, but neither is perfect, since in both ships it seems probable that the primary guns will interfere with the fire of the secondary ones.

It will be seen that the word "strongest" when applied to a ship of the line conveys no definite meaning in the absence of any accepted principles to govern either the distribution and thickness of the armour or the distribution and sizes of the guns. Cannot those principles be derived from the war facts—which in fighting are the natural ones—just as Darwin deduced the principles of evolution from an examination of the facts of Nature?

REGINALD CUSTANCE.

CHAPTER VI.

The *Personnel* of the German Navy.

To write anything really instructive about the *personnel* of the German Navy would be impossible without first explaining the foundation on which the whole armed might of Germany, on sea and land, is based. This foundation, which imparts to everything quite a special impress, is the universal obligation to serve. The view of the old Germans, to whom the people and the Army were as one, making the young man a member of the State only when he became able to bear arms, has, in the course of centuries, undergone many changes. Professional soldiers and recruited and conscript armies alternated and mingled with each other, until the overthrow of Prussia by Napoleon brought about the re-birth of universal conscription, which a hundred years ago again produced a national Army, and was the instrument of the rise of Prussia, becoming later again the mightiest lever for the unification of Germany, and is to-day the foundation-pillar on which Germany's prestige and power, on water as on land, rest.

Universal service, the basis of supply.

Every German is liable to bear arms and cannot provide a substitute. The forces are the Army, the Navy, and the *Landsturm*. The Army is divided into (1) the Standing Army, and (2) the *Landwehr*; and the Navy into (1) the Fleet, and (2) the *Seewehr*. The Standing Army and the Fleet are constantly ready for active service, and are schools for training the whole nation for war. The *Landwehr* and the *Seewehr* are intended to support the standing Army and the Fleet. The obligation to serve in the Fleet commences, as a rule, on January 1st of the year in which the young man completes his twentieth year, and lasts seven years. Of this period the men spend the first three years in uninterrupted active service, and belong to the active Navy. During the remainder of the seven years' period the men are drafted into the Reserve, when the annual exercises or manning of the Fleet do not necessitate their recall to service. Each Reservist is obliged to take part in two training-courses during his period in the Reserve, each course not exceeding

eight weeks. On completion of the seven-years' term the men enter the *Seewehr*—in its first class for five years, and its second class until March 31st of the year in which the men complete their thirty-ninth year. The two categories differ only in the more or less loose connection which, under supervision, they maintain with the military authorities, and the men are reckoned as on leave. There is, moreover, an Ersatz Reserve, which serves, on mobilisation, for completing the Navy, and is composed of men who have not served therein, because they were in excess of the number required, or were exempted for domestic reasons, or did not physically fully satisfy the requirements. They are subject to attend three training-courses up to their thirty-second year, which courses, however, have for a long time not been held. The *Landsturm* can in cases of necessity be called upon to complete the Army and Navy. It is composed of all men liable to service between the completed ages of seventeen and forty-five, who belong neither to the Army nor the Navy in any other capacity. To put it briefly, all fully utilisable and trained men for the Fleet belong to the four yearly contingents of the Reserve, and the five yearly contingents of the first-class of the *Seewehr*. There is, therefore, a Reserve of nine yearly contingents available for immediate use. The *Seewehr* of the second-class includes men who, physically, are not altogether utilisable, and this is still more the case with the *Landsturm*.

Conscription for the Navy.

For service in the Navy exclusively is reserved the seafaring and semi-seafaring population of the Empire, but, if such population does not suffice, further requirements are met by taking suitable men liable to service from the country population. To the seafaring population of the Empire belong: (*a*) Seamen by calling, being men who have served for at least one year at sea in coasting or harbour craft, whether as sailors, waiters, machanics, stokers or artisans; (*b*) sea, coast and harbour fishermen who have carried on their calling for at least one year; (*c*) men who have served one year in the engine-rooms of river steamers. To the semi-seafaring population belong the seamen mentioned under (*a*) when they have served at least twelve weeks, and under (*b*) men who have at all made fishing their calling. Men from the country population are considered suitable partly according to the place they come from, as in the case of inhabitants of coast regions and islands, and partly according to their callings. Callings which receive preference are those carried on on the water (watermen, ferrymen, boatmen, and raftsmen) and those which necessitate hard work in the open. For the engine-room *personnel*, firemen, stokers, metal-workers, etc., are, of course, especially suitable. Every young man is, moreover, free, on completion of his seventeenth year, and in the event of his possessing

the necessary physical and moral qualifications, to enter the Navy as a volunteer.

These are the features governing the recruiting of the *personnel* and the length of the service. There are numerous exceptional provisions, and it may be affirmed that Germany is far from utilising her population to the full extent, as the number required is far below the number available.

Professional long-service *personnel*.

In every living military organism a *Berufspersonal*—a professional *personnel*—is, of course, indispensable; that is to say, a *personnel* which does not merely serve in order to fulfil a liability, but voluntarily for a longer period, either to take up particular duties which require long apprenticeship, and mean the profession of a lifetime, or for other reasons to assume the obligation to serve for a definite number of years. By the expression *Berufspersonal* I desire to designate the whole of the *personnel* who voluntarily serve for a longer period than the specified three years, while those who serve only for the specified period of service I will call by the name of *Ersatz.* I will, moreover, confine myself to the *personnel* which serves for the purely professional purposes of the Fleet, leaving out of consideration the medical, legal, spiritual, and administrative branches.

To the *Berufspersonal* belong Executive Officers (*Seeoffiziere*), Naval Engineers, Warrant Officers, Petty Officers, and specialists of every kind. By specialists, I mean the *personnel* charged with special duties, or who carry out functions which cannot be adequately met with short-service *Ersatz* men. It is obvious that the development of technical science in connection with the Fleet exercises a decisive influence on the numbers required of the *Berufspersonal*, that different views may be held as to the number necessary, and that the predetermination and timely supply of the requisite number is by no means a simple problem; nay, is one of the most difficult with which the Naval Administration has to deal.

Executive and Engineer Officers.

I must here remark, with relation to the Officer *Berufspersonal*, to which belong Executive Officers and Naval Engineers, that, in contradistinction to some other navies, the view obtains in the German service that these two professional classes must be kept quite separate from each other, and this for the reason that such a large amount of altogether different special knowledge is considered necessary for each of these professions that it is regarded as impossible for one man to possess proper knowledge of both. This conviction springs less from theoretical reflection than from the experience we have gained with the engineer *personnel*, and from the gradual development of the engineer's career, which even to-day is not complete.

Entrance of Executive Officers.

The body of Executive Officers is supplied by young men who, after giving proof of their personal qualities and scientific grounding, are appointed cadets (*Seekadetten*). The German higher school system, and the separation of the higher schools from the universities, are based on the fundamental idea that young people must, prior to devoting themselves to a special profession, receive at the higher schools, as a grounding, a purely general and scientific preparatory education, the extent of which must vary, of course, with the profession. It is our opinion that all professional knowledge is most sanely built on such a foundation, and that all professional knowledge has to be left to the university or other special educative system. Thus, for the profession of the Executive Officer, a thorough general preparatory education is considered more important than one which includes requirements of the profession to be subsequently adopted.

The real conclusion of all higher school studies, preparatory to the universities, is formed by a so-called "maturity" examination (*Reife-Prüfung*), which is not, however, made obligatory for entrance to the Navy, because thereby a number of young people whose entry is desired would be excluded. Such are, for instance, the sons of those officers and officials who are frequently transferred from one place to another, with the result that their sons are obliged to change their schools, whose demands would, for the majority, cause such delay that they would be too old if the final examination were demanded. About 80 per cent. of the entrants have, however, to-day passed the "maturity" examination. For the others there is provided a special entrance examination, or, according to the schools from which they come, a partial examination, the object of which is to show that the candidates possess a sufficient general grounding. Thorough physical fitness, personal appearance, suitable age, irreproachableness of family, and ability to defray the necessary expenses are the other qualifications governing the selection of candidates. There are no cast-iron rules as to age, which varies from seventeen to twenty years. The average age of those who have passed the "maturity" examination is nineteen, that of the others somewhat less. The requirements of the entrance examination correspond to a two years' shorter period at school, and boys who take this examination can therefore enter two years earlier than those who pass the "maturity" examination at the higher schools. As an incentive, however, to the taking of this examination, those who do take it receive certain privileges, being allowed seniority over the others, and they may subsequently receive commissions a year earlier, if they prove their worth in practical service.

Training.

Enrolment takes place each spring, at the beginning of April, at

the Naval School at Mürwik, near Flensburg. This school, which was erected a few years ago, and is splendidly situated on the Flensburg Inlet, constitutes the central point of everything relating to the development of young executive officers. The Director of the school is under the Inspector of Naval Education, who in his turn is in these matters subordinate to the Secretary of State of the Imperial Naval Department. Naval cadets newly entered are regarded as belonging to the military *personnel*, rank with ordinary seamen, and draw pay. They first receive a course of training lasting for about five weeks, which embraces general military knowledge, as well as rifle practice, and are then sent afloat for the remainder of the year for their first sea training, in one of the training ships, which are at present four old cruisers of the Hertha class, each accommodating from fifty to sixty naval cadets. The training is predominantly practical in all branches of the service, from general seamanship and navigation to the tending of boilers and engines. The direction of development in all fleets has brought practical training in technical science to a considerably greater extent into the foreground, and the time formerly taken up in training under sails is to-day fully necessary for the general extra technical grounding requisite. Hand in hand with practical training goes instruction in the professional sciences. The training ships first cruise a few weeks in Home waters, and then go abroad for eight or nine months, as a rule to West Indian waters or the Mediterranean. The German winter climate would place great obstacles in the way of practical preliminary training, and it is also considered necessary to show the cadets foreign countries and foreign customs, all imaginable assistance being given to enable them really to get to know the places they visit. This first year is also intended to provide the opportunity of eliminating individuals who prove unsuited for the profession.

Promotion.

On the conclusion of the voyage those cadets who receive a favourable certificate have to take the examination of the Midshipman (*Fähnrich zur See*), and after passing are promoted to that rank. They are next sent for a full year to the Naval School, mainly for theoretical training in the professional sciences, and laboratories have recently been built there for work in general mechanical engineering and electrical technology.

The Naval School.

The year is one of close intercourse with a large number of comrades and officers, under the special conditions obtaining at the Naval School, and is destined to have a decisive influence on character. In addition to science, there is instruction in sport and games and the attainments required for social life and comradeship. The object is the further training of the Midshipmen, and their preparation

for the principal examination for Executive Officers, with which the period of instruction closes. After this examination they are sent for a period of six months to the gunnery school, the torpedo training ship, and the Marine Infantry, the latter in order to gain further practical knowledge of infantry service. Each of these courses ends with an examination, which, with the certificates relative to practical service, give definite determination of seniority. The main scientific preparation of Midshipmen ends here, and they are sent on board ship for a further year's practical training, as many as possible going to the High Seas Fleet, the remainder to large vessels bound for abroad. If they obtain favourable certificates they can then be promoted to the rank of Sub-Lieutenant (*Leutnant zur See*)—that is to say, after three-and-a-half years' training, over two years of which are spent on board. The Sub-Lieutenants then remain a further year on board, during the greater part of which in the vessels to which they were appointed as Midshipmen. There are no precisely formulated conditions for promotion to higher rank, but after about three years, Sub-Lieutenants are promoted to the rank of Lieutenant (*Oberleutnant zur See*), and until this period they are as a rule on board, though there are cases of short temporary shore appointments.

Sea and shore service. Sea service is to shore service in the course of the career approximately so proportioned that of Lieutenants 93 per cent., of Senior Lieutenants (*Kapitänleutnants*), about 70 per cent., of Commanders (*Korvetten-* and *Fregattenkapitänen*) 45 per cent., and of Captains almost 45 per cent. are afloat. These low figures, in the case of the higher ranks, may perhaps appear astonishing, in view of the fact that the German Fleet keeps so many vessels in commission, but the further fact must be taken into consideration that the whole coast defence of all important points devolves on the Navy, and that Naval officers are exclusively taken to fill posts where officers are required. The central authorities in Berlin, moreover, require a very large number of naval officers of the higher ranks.

Ranks and service. At the present time the ranks in the German Navy are attained after approximately the following periods of service:—Sub-Lieutenant, after 3½ years' service; Lieutenant (*Oberleutnant*), after 6½ years' service; Senior Lieutenant (*Kapitänleutnant*), after 10 years' service; Commander (*Korvettenkapitän*), after 18 years' service, (*Fregattenkapitän*), after 22 years' service; Captain (*Kapitän zur See*), after 23½ years' service; Rear-Admiral, after 30–31 years' service; Vice-Admiral, after 34 years' service. Promotion has hitherto been exclusively effected by seniority. The possibility of preferential promotion is provided for, but has so far never been adopted.

Cost to parents.

With regard to the expenses of the career, the costs which the parents have to defray amount, up to the cadet's promotion to the rank of officer, to the sum of £250 in round figures. A yearly allowance of £30 is required for a further period of approximately 4 years, so that the total expenditure to be met in seven to eight years amounts to £370. It is here assumed that the officer can live independently on an income of about £125, to do which a strong will, thrift, and a simple mode of living are required, but these are qualities that cannot be too strongly impressed on young Naval officers.

Pay and pension.

The service pay of Executive Officers is as follows:—Sub-Lieutenants and Lieutenants begin with an approximate total pay of £100, rising at the beginning by three-yearly and subsequently two-yearly increases to £150; Senior-Lieutenants begin with £235, rising by two increases to £315; Corvette Captains receive £390; Frigate Captains, £447; Captains, £530; Rear-Admirals, £640; Vice-Admirals, £985; Admirals, £1675. On board ship there is added, as everywhere, the allowance for mess purposes, which allowance is, however, such that it is only by economical mess management that the expenses can be met. The picture would be incomplete if mention were not made of the pensions allowed after leaving the Service.

After 10 years' service every officer, who, in the responsible judgment of his superiors, is no longer in a position to discharge his duties, has a legal right to a pension, which is calculated according to the amount of the remuneration he has hitherto received and the length of his term of service. The average amounts are, approximately, as follows:—Admiral, £975; Vice-Admiral, £675; Rear-Admiral, £465; Captain, £360; Frigate Captain, £315; Corvette Captain, £255; Senior-Lieutenant, between £95 and £185; Lieutenant and Sub-Lieutenant, between £45 and £70.

Years of service abroad are counted double. In the officer's career the decision to take up a special branch plays, of course, a certain part. Specialising for the torpedo branch begins with the Sub-Lieutenant, as a larger number of those considered suitable are appointed as watch officers in the destroyer flotillas, and from these selection is subsequently made of destroyer commanders, after a three months' training in the torpedo training ship together with officers who are preparing for the torpedo service on board the large ships. The gunnery career of Lieutenants begins from about the eighth year of service onwards. The attainment of full qualification is divided into two stages, each stage forming the object of a special year of preparation. Scarcely any Senior-Lieutenant

or Lieutenant has *not* been through one of these special training courses, a fact which shows that general availability for service is independent of the special training. The possibility of being employed in the special arm extends as far as and includes the Commander. There are as yet no regulations for the flying and submarine services, as both of these branches are only in the infancy of their development.

Characteristics of German Executive Officers.

In characterising the corps of officers, I must point out that the present German Navy had its origin in a Prussian one, and that the Prussian corps of officers and the German corps in general occupy a particularly privileged position as regards the reigning princes and the State and society is a well-known fact. This position is assigned to the profession as such, and is indicated by the officer's uniform, which he wears not only on service but also on all other occasions as his dress of honour, conferring on him certain advantages, while, on the other hand, imposing on him many duties also.

The Emperor and the Navy.

These fundamental ideas, primarily of Prussian origin, have been successfully inoculated in the Navy. The Kaiser has in person the supreme command of the Navy, and all appointments and commissions come from him direct. Apart altogether from this, the strong bond which the present Kaiser, the real creator of the Navy, has formed between it and his person, is, in particular, well known. It may, perhaps, be the best mode of characterising the spirit which is encouraged and fostered in the corps of officers, if I append the text of an order of Kaiser Wilhelm I., of which the present Kaiser said: "The officers of my Navy must retain unaltered the earnest and pregnant words expressed by my grandfather, now resting in God, which for all time must serve as a guide to the duties of officers":—

> I expect, therefore, that in future, as hitherto, honour will be the most precious jewel of the entire Corps of Officers of my Navy. To keep it pure and free from reproach must remain the most holy duty of the whole profession, as of each individual member of it. The fulfilment of this duty carries with it the conscientious and thorough fulfilment of all the other duties incumbent on an officer. True honour cannot exist without faithfulness unto death, unflinching courage, steadfast determination, self-denying obedience, unalloyed truthfulness, strict reticence, and the all-sacrificing fulfilment of even what appear to be the smallest duties. It demands that, in the outside life of the officer, likewise the dignity shall find expression which springs from the consciousness of belonging to the class to whom is entrusted the defence of Throne and Fatherland. It must be the endeavour of the officer to select for companionship only those in whom good morals predominate, and he must least of all in public places lose sight of the fact that he appears not only as an educated man but also as the bearer of the honour and the enhanced duties of his profession. . . . The more, on the other hand, luxury and good living extend, the more earnestly does it become the duty of the Corps of Officers not to forget that it is not material possessions that have acquired for them their honoured position in the State and Society and that will retain for them such position. The danger which the quest for lucre and good living brings with it is not only that the warlike efficiency of the officer may be prejudiced by an effeminate mode of living, but also

that the very ground on which the profession of officer stands may be fundamentally shaken. The more zealously the Corps of Officers fosters true comradeship and real *esprit de corps* the more easily will the officers avoid excesses, lead back into the right path those of their comrades who have gone astray, and prevent needless quarrels and unworthy wrangles. The legitimate pride of the officer must never degenerate into lack of respect or haughty presumption towards other professions. The more the officer loves his profession, and the higher he counts its objects, the more clearly he will realise to what a high degree complete confidence in the Corps of Officers is a condition of the successful and glorious fulfilment of the Navy's last and highest task.

Engineer Officers.

The engineers of the Navy stand, as a body of officers, side by side with the Executive Officers. That was not always the case, for it was the development of the technical services on board warships which brought into being the present position of the Corps of Engineer Officers. The duties and importance of the engineer were naturally very different during the period of fully-rigged ships, with auxiliary engine power, from what they are nowadays, when practically everything is done by machinery. One principle we have retained from earlier times, and that is, that the summit of the career of the engineer officer is attained when he becomes Chief Engineer of a modern battleship. The only thing that matters to the Navy is to have practical engineers—that is to say, men who are absolutely first-class in the working of ship's machinery, and the control of such working. The office of Chief Engineer is therefore the natural goal and termination of the naval engineer's career. Beyond this only a few more are needed, on whom devolves, in the case of large staffs, apart from their consulting voice in technical matters, the principal duty of superintending the work of the chief engineers, and of making proposals in connection with the distribution of *personnel*.

There is in no direction any practical need for an extension of these duties. For the majority of executive officers, the goal and terminal point is the command of a battleship. Beyond this is the career of the flag officer, up to the Commander-in-Chief of the Fleet, the leader on whom, when the call to arms goes forth, the fate of the nation may depend. Judged from this point of view, it is natural that the career of the executive officer should be a higher one than that of the naval engineer, and it is from such considerations that the endeavour springs to acquire for the higher career the very best material obtainable.

Engineer Officers' position and career.

Equally great qualities, perhaps, are demanded of the engineer, but they are of a different order. In his case they are predominantly technical, in that of the executive officer predominantly military. Experience teaches us that, as a rule, in Germany military qualities and the faculty of leadership, engendered by tradition and education, may be found with greater probability in the sons of certain classes

than in those of others, so that it is a duty to bring such young men into the profession of executive leaders, while actual experience tells us that youths coming from the practical professions of the middle classes make quite excellent engineers. By far the greater number of our old engineers, who have established the reputation of the Corps of Engineers, come from these classes.

The social question and professional ability. These two teachings of experience have therefore, as their consequence, the fact that, as a rule, the material available does not emanate from the same sources, a fact which is desirable in the interests of selection, and that the two corps do not belong usually to the same social strata, and do not possess the same grounding. This fact has been, however, proved to be of no importance from the Service point of view, and does not interfere with either living or working together on board ship, which is indeed the main point. Our old engineer officers have acquitted themselves splendidly in every sense, and we ascribe this to a great extent to their training, which has demanded a very long and thorough practical experience of machinery work, with a very thorough selection of the fittest from out the whole engine-room *personnel.* The engineer served from the bottom upwards, and it was only his professional ability that lifted him from the ranks of the *personnel.* This has now, indeed, been all changed, and has had perforce to be changed; but from this experience we have acquired the second guiding principle—that long practical training is of the essence of the thing, and that the greatest care is required in combating efforts to shorten the period of service necessary for a man to attain the rank of engineer.

Entering Engineer Officers. Young men are enrolled as naval engineer candidates in the autumn of each year after testing their personal, scientific and practical suitability. The requirements are thorough physical soundness, a stainless record, an age of not over twenty-one years, and means sufficient for providing an allowance to eke out the Service pay, amounting in the first year to £2 a month; in the next two years, in which the rank of Petty Officer is attained, with corresponding pay, to 30*s.* a month; and for a further year to about 20*s.* a month. The rank and pay of a Warrant Officer are now attained, and this is held to be sufficient to meet a man's needs. There must furthermore be guaranteed an allowance of £5 towards clothing expenses.

Cost to parents and qualifications. The total expenses amount therefore to at least £112. The requirements for scientific suitability are the qualification for one year's voluntary service, which can be acquired at the higher schools three years before it is possible to take the "maturity" examination, and the passing of an entrance examination, which embraces engineering,

physics, mathematics, mechanics, drawing, and a knowledge of English and French. In addition the candidate must have had two years' practical experience. Definite periods of employment at boiler works, a copper forge, a smithy, and at machine construction works, are required, and a demonstration must be given of the knowledge thus acquired at a practical examination, which consists in the execution of machinery, locksmith's, turning, forge, and tinsmith's work. Candidates enter with lower-deck rating and, from the very beginning, are kept separate from all the other *personnel* of their branch and provided with separate accommodation, have a mess of their own, and wear a special uniform. On enrolment the candidates receive a three months' training in military matters, and then go for a nine months' course with the High Seas Fleet, where they receive practical instruction in everything relating to boilers, engines, auxiliary engines, and ship's boats. An examination is next followed by promotion to the rank of Petty Officer. After this comes a two years' period of practical service in Petty Officer's duties in ships and destroyers, and one year's attendance at the Engineer School, which is intended to provide the necessary theoretical groundwork for the understanding and consolidation of what has been learned in practice. These Engineer Schools—one at Kiel, for the Baltic, and the other at Wilhelmshaven, for the North Sea—have, as regards the engineer *personnel*, objects similar to those which the Naval School has to the naval officer, that is to say, perfecting qualifications in the scientific and general educative sense.

Promotion of Engineer Officers.

The rank of Warrant Officer is attained after the first school year. There now follows a four years' training of practical work in engineer duties, two years of which are frequently spent on board destroyers. This period is followed by the second school year, and then comes promotion to the rank of Engineer, which is attained as a rule nine years after entry into the Service. The ranks correspond to those obtaining in the case of Executive Officers: Engineers, Senior Engineers, Staff Engineers, Senior Staff Engineers, and Chief Engineers. The latter have at first the rank of Frigate Captain, but may receive also that of Captain. This terminates the scale of ranks, in accordance with the views previously set forth. The period of service elapsing before these several ranks are attained can, for the time being, only be given for the lower ranks, since no member of the *personnel* enrolled according to the new method has as yet attained a higher rank than that of Engineer. The period of service of all the older *personnel* is based on different assumptions. The oldest Chief Engineer serves at the present moment thirty-seven years. There is as yet no conclusive evidence as to whether the practical experience of the

new Engineer Corps will be of equal excellence with that of the old one, though present-day appearances point to this being the case.

The approximate apportionment of service at sea as compared with shore service is for engineers 80 per cent., senior engineers 68 per cent., staff engineers 47 per cent., and chief engineers 33 per cent. The approximate average pay and pension of the various ranks is as follows: Pay and promotion

	Pay. £	Pension. £
Aspirant (Warrant Officer rank) .	125–150	—
Engineer	255	100
Senior Engineer	310	150
Staff Engineer	430	270
Senior Staff Engineer	475	350
Chief Engineer	535	415

It must be observed that naval engineers have nothing to do with theoretical engine construction, there existing for that purpose quite a different official *personnel*, educated on different lines, which does not belong to the *personnel* serving on board ship.

Turning now to the lower deck we find the professional *personnel* divided into two large branches—the Seaman Branch and the Technical Branch—one of the essential differences between these being that the technical subordinate *personnel* is recruited from outside the Service, from volunteers, or those serving beyond the obligatory period, whereas the Seaman Branch is for the greater part recruited from boys whom the Navy itself trains. The object in the case of all professional *personnel* is to retain men in the Service for as long a period as possible, and the liking for the military profession in Germany is very strong. The soldier's uniform is held in particular respect, and the wearing of the Kaiser's colours is still always an honour for the great majority. Morover, the advantages of prolonged service are manifold. The man's future is safeguarded. Provision for men leaving the Service is made in two ways. On the one hand, the public authorities are obliged to allot, to Petty Officers who have served for a period of twelve years, subordinate official posts, which are precisely specified, while, on the other hand, all important careers open to them in the Navy end with the rank of Warrant Officer and Senior Warrant Officer. These draw not inconsiderable pay, and are entitled to a pension. The Warrant Officer rank is intended to be the principal means of keeping a good *personnel* in the Service. It is impossible here, however, to show at what varying periods this rank is attained in the various branches, but the Warrant Officer, taking the average of all branches, remains nineteen years in the Service. Lower deck *personnel*, conscripts and volunteers.

Seaman *personnel.* Entering boys.

The seaman *personnel* is, as has been stated already, recruited for the greater part—namely, to the extent of 73 per cent.—from ship's boys. The boys may be youths whose ages range from fifteen to eighteen, and who are physically eligible and strongly developed, have not suffered punishment for any misbehaviour betraying a lack of honour-loving sentiment, and can write, read and count. They must apply voluntarily, and undertake to serve, for particular periods, two years as boys, three years in fulfilment of their service liability, and four years in return for the training they have received. They are in consequence frequently styled nine-year men, although the Navy really has only a seven years' use of them. They are enrolled at the beginning of October of each year, whereupon they are put on board the stationary training ship at Mürwik for the first half-year, in which they become accustomed to conditions obtaining on board, are trained in general military and seafaring duties, and particularly in boat duties, and are carefully developed both physically and morally. Then, in the spring of the following year, they are sent for a year to the sea-going training ships for practical training, being the same cruisers that carry the cadets. The boys return to spend the last half-year in the stationary training ship, where they receive instruction in infantry work with the use of the rifle, though boat work and physical development are actively pursued. On the expiration of two years they are sworn in and become seamen, being allotted, as far as possible in deference to their wishes, to the various branches of the Navy, *e.g.*, the seaman, torpedo, mining, or submarine branches. Their further career is subject to the same ordinary regulations as in the case of all other volunteers. In certain matters, however, as, for instance, selection for courses of training, they are naturally preferred to *personnel* serving for a shorter time; and in the first year of their service in the front line, at least, come in for special observation and instruction. In consequence of the number of applications being considerably in excess of requirements, the selection of boys is a very good one and the material is quite satisfactory.

Volunteer professional seamen.

Apart from the boys, the professional subordinate seaman *personnel* is recruited from volunteers—that is to say, young men who apply for service in the Navy at ages ranging from seventeen to twenty years, or in other words, before they really become liable to service. Anyone can apply who is capable of serving, though young men from the seafaring and semi-seafaring population may alone apply for service in the Navy. Volunteers have the privilege of choosing the branch of the Navy they prefer to join, and the branches which accept such volunteers are: the Seamen Divisions at Kiel and

Wilhelmshaven, the Torpedo Divisions at the same ports, the Mining Section at Cuxhaven, and the Submarine Section at Kiel. Boys are likewise transferred to these same branches after they have become seamen.

Duties of the Seamen Divisions: Recruiting, training, complements.

The Seamen Divisions are composed exclusively of seafaring *personnel*, and have no naval craft assigned to them. They have for their object the recruiting and preliminary training, for the High Seas Fleet, of all the professional seaman *personnel*, with the exception of boys and the torpedo *personnel*. The whole of this *personnel* has to be borne on their establishments, and they have to see to the special training and right ordering of such *personnel*, and to regulate the promotion of the same. The Seamen Divisions enrol, furthermore, the whole of the *personnel*—the torpedo *personnel* excepted—required for manning ships on foreign stations, training ships, and special ships, as well as for garrison service on land, and train such *personnel* in all military duties.

The Torpedo Divisions have under their charge all destroyers ready for war, and have to keep the crews of the same constantly ready and at full strength, available in their correct proportions, and properly trained. They thus have to enrol the seaman and technical professional and *Ersatz personnel* they may require. These Divisions have, furthermore, to supply all the ships of the Navy with the torpedo specialists required, these being borne on their establishments, and they supply the ordinary *Ersatz* for the whole Navy, and undertake the military training of the same for ships on foreign stations and training and special ships. The Mining Section has charge of all mine craft, and has to make provision for the same in precisely the same way as the Torpedo Divisions provide for the torpedo-boats. It has, however, no *personnel* for other purposes than its own. The Submarine Section has charge of the submarines, and has to make provision for them in the same way as the Torpedo Divisions have to provide for their torpedo-boats, while it has likewise no *personnel* for other than submarine purposes.

The trained men enrolled in one of these branches remain in the special career of their choice. There are ship's boys, one-, three-, four-, five-, and six-year volunteers, and re-enlisted men. One-year volunteers are of value from the point of view of their quality, though they are not reckoned among the professional *personnel*. Three-year volunteers have no particular value, as they do not serve longer than the *Ersatz*. Four-, five-, and six-year volunteers are trained for and admitted to special careers according to their suitability, deference being shown as far as possible to their own particular wishes. The same treatment is accorded to what are

known as *Kapitulanten*—that is to say, men who, during the period of obligatory service, declare their desire to serve a further year, and then subsequently repeat the process. To give an idea of requirements, it may be stated that of the seaman *personnel* of the Fleet 31 per cent. are professional *personnel*.

Specialist lines and branches. The first great dividing line in the specialists is provided by assignment to one or other of the naval branches. We, therefore, have the professional seaman *personnel* of the Seamen Divisions, the Torpedo Divisions, the Mining Section, and the Submarine Section. Special training is provided by courses in which the men reach the rank of Petty Officer. The Seamen Divisions produce gunnery ratings, boatswains, signal staffs and others, rising to Petty Officer and Warrant Officer. Every Petty Officer belonging to the Torpedo Section is a specialist trained in working all the particular installations and arms mounted in destroyers, including light guns, as well as in the torpedo duties on board large warships. The Petty Officer of the Mining Section is specialised for everything in connection with mine craft, and the Petty Officer of the Submarine Section for everything in connection with submarines, in so far as such duties devolve on the seaman *personnel*.

In the Seamen Divisions there exist side by side several careers the *personnel* for which has its source in the body of thoroughly trained seamen. It may be noted that there are in the gunnery branch men who rise to the rank of *Feuerwerksoffizier* after about 16 years' service, their work in this capacity lying mainly in the direction of administration. They serve in the ordnance and ammunition depôts and in the Imperial Dockyards, in connection with the acceptance and checking of fresh supplies and the like, and in duties connected with storage and upkeep. Only a small number of this subordinate *personnel* are afloat, and there is a special *personnel* for the technical work in connection with ordnance mounted on board ship. Special conditions are laid down for promotion in the several branches. All gunnery specialists are taken from among the Petty Officers' ratings, and whoever wishes to become a Petty Officer must first have gone through a course of gunnery training. The courses and training vary, giving an opportunity for the selection of the best men for the career of chief-gunner.

Engine-room *personnel*. The technical professional *personnel* is recruited exclusively from volunteers, and re-enlisted members of the engine-room staffs, who are enrolled as engineer candidates. These men are employed in the Dockyard Divisions, the Torpedo Divisions, the Mining Section, and the Submarine Section.

Divisions. As regards the Dockyard Divisions, it may be stated that they have

to play exactly the same part with respect to the technical *personnel* for the whole Navy as the Seamen Divisions do with respect to the seaman *personnel*. The engine-room ratings are recruited from men of the seafaring population who have the qualifications of engineers on board German ocean steamers, or are otherwise specially qualified under certain rules. Men who volunteer for more than three years, and are ready to serve longer than the obligatory term, pass into the ranks of the professional *personnel*, and are trained and promoted accordingly. The training is chiefly practical, and there is promotion to Petty Officer and Warrant Officer. The engine-room *personnel* is altogether distinct from the stoker *personnel*. The latter consists solely of *Ersatz* men, who work chiefly at the boilers, though the engine-room ratings are, of course, trained to work at the boilers also, and, in particular, to supervise the working of the boiler-room, but do not stoke. Stokers who wish to serve longer pass over to the engine-room *personnel*, but only do so when they can show proof of qualifications. The only other special branches in the Dockyard Divisions are in connection with the radiotelegraph experts and ordnance artificers.

From what has been said, we hope it is clear that the responsible and executive centres for the professional *personnel* and its selection and training are first and foremost the naval departments on land. The making-up of the complements of ships and the transfer of the same rest with them, or those to whom they are subordinate, and that this is a very difficult task, and one which requires special organisation, considering the size of the German Fleet to-day, is evident.

Ersatz or conscripted men.

Of the active *personnel* there remains still to be discussed the *Ersatz*—that is to say, the *personnel* which serves only the obligatory period. The *Ersatz* of the seamen and technical ratings may be discussed together. The keeping of the lists of the *Ersatz* lies likewise with the naval departments on land, but the whole of the High Seas Fleet enrols its own *Ersatz*, and trains them itself. The *Ersatz* men for all other ships are trained in military matters by the shore departments, though the torpedo, mine and submarine services have to see to the manning of their vessels on their own account. The nature of the training of these short-service men for the Fleet and for the vessels of the other branches of the Navy is essentially different, and must therefore be dealt with briefly, as this point is very important from the point of view of readiness for war. As a rule the *Ersatz*—that is to say, the recruits—are enrolled in the autumn and the spring.

Training of conscripts.

The Fleet enrols all its recruits of every kind in the autumn. Immediately on coming on board each man is trained, first of all, in the duties attaching to his fighting station, with a gun, in the

ammunition chamber, or at the boilers. The ship goes to sea at once, with a view to getting the men somewhat accustomed to the sea and service on board. Fourteen days after the arrival of the recruits the first firing practice with shell is carried out, with the recruits at their fighting stations. This does not, of course, mean that the stations on board ship are completely changed in the autumn, but that already in the summer the stations are so altered that the men who are to be discharged in the autumn hold those stations which later on are to be assumed by the recruits, so that the latter may take up the least important posts in a system already in full working order. Naturally, readiness for war is diminished by the arrival of the recruits, but by this arrangement, and by a course of very intensive training, especially framed to meet these conditions, this state of affairs is reduced to a period of relatively short duration. That it is desired still further to reduce it appears from the Naval Act of 1912, though how this will be done is not yet determined. It may be done either by the recruits being previously trained as far as possible before coming on board ship, or by the dates of enrolment in the several squadrons being made to alternate with each other.

System of flotillas. The Torpedo Divisions, each of which has three flotillas, or a multiple of three, enrol every year the full number of recruits for one of three flotillas. These recruits remain for the whole three years of service in this flotilla, which during the first year is almost constantly in commission, while during the other years it is commissioned for a shorter period. The same course is followed in the Mining and Submarine Sections.

One-year volunteers. We have still to speak of the one-year volunteers, who here, according to the definition adopted, must be counted amongst the *Ersatz*. For those branches of the Service of which we are speaking here, they are young men of the seafaring population, who have the scientific qualifications necessary for one year's service, or the certificate of a sea-pilot, or have passed the preliminary examination for a ship's engineer, or are engineer-assistants who fulfil certain conditions. They only need to serve one year, are specially qualified by their previous training, and, therefore, do good service, and are of importance as furnishing naval officers and engineers for the Reserve.

Reserves. The Reserve *personnel* of our Fleet comes principally from the subordinate *personnel* in the manner already described at the beginning of this paper. Petty Officers and specialists are obtained from all those men who leave active service, and are able-bodied, being transferred, according to the law of conscription, to that class of the Reserve or the *Seewehr* to which their period of service or seniority

entitles them. Moreover, specially qualified men of the *Ersatz* are specially trained and enter the Reserve as Petty Officers. Even though it may be rightly considered that a large number of these men are not thoroughly competent, for instance, as gun-captains, because they are not in practice, they can, nevertheless, in case of war, serve as Petty Officers in the war-formations, and thus set free Petty Officers on the active list, that is to say, expert gun-captains. As the technical *personnel* carries on practically the same work in civil life, it remains for the most part fit for service.

Reserve officers.

The Reserve of Naval Officers is formed to a certain extent of retired officers who are still fit for service and enter the Reserve or the *Seewehr* according to seniority, though mainly of officers specially trained for the purpose. With this object suitable men are chosen from among those one-year volunteers who are seafaring men by profession. They are trained separately for the purpose, and after having served their time as Petty Officers and Warrant Officers, are called up, at not very great intervals, to take part in manœuvres, during which they have to perfect themselves and give proof of their ability. Finally, they become Lieutenants; they must, however, do service again from time to time, and may be promoted to the rank of Senior Lieutenant. As a matter of fact, by far the greater number of the officers serving with the big steamship companies are Reserve Officers in the Fleet. There is an ample supply for all requirements.

The procedure is exactly the same in the case of engineers of the Reserve, who likewise mount upward from the ranks of the technical one-year volunteers.

Large complements of ships. The new Law.

A comparison of the complement-rolls of the various fleets shows that modern German warships are somewhat more heavily manned than is the case with those of most other nations. This must be ascribed to the fact that we base our estimates on different principles. From this fact, together with what we have already stated, an idea may be formed of how it is possible to increase the number of units in commission under the Navy Act of 1912. Naturally, professional *personnel* cannot be produced in a day, but a reserve which could be drawn upon existed in the greater strength of the crews, which could in all probability be reduced for a time, and in the *personnel* of the branches of the Navy on land. It is therefore by drawing upon the ships in the Fleet, as well as upon the naval sections on land, by placing ships of the reserve out of commission, and reducing the strength of all other establishments to a minimum, that the High Seas Fleet could and can be strengthened. The vessels to be kept more in commission, as compared with the previous plan, are only the small battleships. The big ones were

always intended to be commissioned as soon as they were ready, as also the battle-cruisers. It must be observed that the professional technical *personnel* are rapidly trained, that in particular the supply of volunteers is always such that almost any number that may be provided for in the Estimates can be enrolled within a short space of time, and that Gunners are available in abundance. Of course, the present state of transition implies, nevertheless, extra efforts, which are everywhere acutely felt.

Advantages and disadvantages of the compulsory system.

Thirty per cent. of the men of the Fleet are professional *personnel*, while 22 per cent. belong to the seafaring population, and 48 per cent. to the landsmen class. It follows that of 70 per cent. of the men, about a third enter the Service every year as new-comers, and that consequently immense efforts must be exerted to meet satisfactorily the demands which the complicated organism of a modern battleship makes. It would, however, be one-sided to consider this fact as nothing but a drawback. I am rather of the opinion that this thorough repetition of fighting duties every year is the most appropriate means of forcing everyone on board to think out afresh, and again go through all that is necessary to maintain a state of readiness for war, that it produces fresh thoughts and fresh ideas, which in time root out all that is useless, and that thus all standing-still is rendered impossible. This is very important. The introduction of fresh elements into the crew, all of whom enter upon the new work with self-sacrificing zeal, and have no greater ambition than to do as well as the old hands, is certainly an added advantage not to be under-estimated. From all these considerations the conclusion must be drawn that our system of universal conscription is undoubtedly a more arduous one than that which works with a body of men serving on the average for a longer period, but that this very fact produces extremely valuable qualities, due to the consideration in which the profession to which the defence of the Fatherland is entrusted is held, to the consciousness of the honour of belonging to this profession, to the necessarily unceasing hard work, and to the constant infusion of fresh blood. The crews of our ships are not yearly batches of various individuals, but a compact whole of firm texture, whose ship is more to them than anything else, who are always good-tempered, whose powers of endurance are superior to everything, and who, no matter when or where the need arises, respond at the given word and do their level best. The men who serve for longer periods may perhaps be better all-round seamen, but at their stations in modern men-of-war I have never seen our men surpassed.

V. KÜHLWETTER.
Kapitän zur See a. D.

CHAPTER VII.

The Spirit of the German Navy Law.

"Wir wollen und sollen unseren Antheil nehmen an der Beherrschung des Erdkreises durch die weisse Rasse."—Heinrich von Treitschke.

"Bitter noth ist uns eine starke deutsche Flotte."—The Emperor William at Hamburg, *October* 18, 1899.

In three successive volumes of the *Naval Annual*, it has been the privilege of the present writer to lay before its readers certain facts concerning the German Navy, which, as everyone may see, is an organization very well deserving of study, not only because of its really great qualities, and the admirable prevision, unchanging endeavour, and practical patriotism with which it has been created, but even more because it is one of the really dominating factors in the politics of the world. In 1909 the subject was the general one of the expansion of the German Navy, its causes and inevitable character. In the next year some features of the Navy Law and its amendments were examined, involving a correction of certain misapprehensions; and an account was given of the increase of shipbuilding and dockyard resources, and the successive additions that were being made to the *personnel*. In 1911 German naval administration was described, and the machine was shown at work translating policy into action in the progressive development of everything that had to do with the Fleet.

Qualities of the German Navy.

Two years have now elapsed, and a further amendment has been made to the Navy Law. The time has therefore come for some further inquiry, and it is a fortunate circumstance that this volume contains a chapter on the German *personnel* by a German naval officer of great experience, recently retired from active service. The object of this present essay is partly to explain the character and objects of the recent amendment to the Law, but in a larger degree to attempt to discover, so far as may be possible, the inner spirit of the Law and of the measures that preceded it, and the forces that have been and are at work. At the outset, I should like to say that the German Navy must challenge and win the admiration of everyone who knows anything about it. The greatest good must come from a recognition of this fact, because we shall thus set a right value upon a Fleet

which it is our utmost interest to understand. What I have before written, and this chapter itself, could scarcely have been written without the practical counsel and assistance of friends in the German Fleet, who have never desired anything but that the character and expansion of the Fleet should be set forth in a perfectly definite and impartial manner without exaggeration or diminution in any respect whatever. They have no part, any more than have British officers, in the international animosities which, within recent years, have disturbed the amicable relations of the States. German officers, indeed, are full of admiration for the British service—a feeling which, I am sure, is reciprocated—and there exists a knowledge, to whatever use the Fleets may be put, that in all essential respects they resemble each other, and that there are the best reasons that they should know and appreciate one another.

Origin of naval expansion.

It is sometimes said that if Admiral Mahan had never written his "Influence of Sea Power upon History" the German Navy would never have become what it is, but this statement betrays a very imperfect appreciation of the facts. Long before Mahan wrote, the Germans had been seafarers, and in much piracy and fighting had learned the need of commanding as much of the sea locally as concerned themselves and their traders. When the ambassadors of the Emperor Otto the Great visited the Emperor Nicephorus Phocas, who captured the throne of Byzantium in 963, that monarch imparted to them, in a compact phrase, his view of the principles and practice of sea power as they affected the situation under discussion. Otto, he said, had no ships, and therefore he, Nicephorus, could, with his fleet, burn and destroy German coast settlements whenever he liked. It is worth while to give his terse exposition in the German in which I have found it: "*Dein Herr hat keine Schiffe; ich aber bin mächtig zur See und vermag mit meinen Flotten jede Deinem Gebieter gehörige Stadt, die an der Küste liegt, nach Gutdünken zu verbrennen.*" During the thousand years that followed Nicephorus, the truths he had uttered entered deeply into the hearts of Germans, and with the expansion of population, emigration, trade and oversea commerce, the provision of some means of exerting power or influence at sea became ever more pressing. The necessity was most apparent in the great centres of industry and foreign commerce in the north, but it was recognized by thinking men in other places, and at the Bundestag at Frankfort, in July, 1817, Baden, a South German state, advocated the creation of means whereby German ships and the Germans who served in all parts of the world might be protected from the predatory operations of enemies and the interference of neutrals. Prince Adalbert, who did not live to see the fruition of his

ideas, did a great deal to instil sound ideas in the German people; and though Von Roon's naval schemes, in 1862, being the first complete programme, found no acceptance with the representatives of the people, Bismarck, in 1865, recognized the great movement of public opinion which had been manifested during the previous twenty years. In 1867 the Reichstag of the North German Confederation sanctioned a ten years' programme; but the war of 1870, and the foundation of the German Empire, brought in larger views, and the so-called foundation naval scheme (*Flottengründungsplan*) was adopted in 1873, which laid down, with particular provisions, the increased need of the Fleet, and of the building of more ships, with adequate *personnel*.

Changing ideas on naval objects.

It is not proposed here to explain the circumstances or features of successive naval enactments in Germany, because this has already been done in the *Naval Annual*, but it is interesting to see what were the ideas inspiring successive programmes. There existed for a long time no definite public opinion in Germany on the naval question. Many of the ideas put forward by more or less responsible bodies were in the nature of what may be called "pious aspirations." There existed a vague knowledge that floating commerce must be protected, unaccompanied by any knowledge of how that protection could be assured. Generally, the ideas were defensive, without any perception of the true essentials of the defensive. Many looked to coast-defence as the real object to be attained. In 1854 Prince Adalbert thought the object of a Prussian Navy must be to safeguard the independence of Prussia and Oldenburg, to protect their commerce even in distant seas, to hold the inner waters of Prussia, to protect the flanks of the Army on the coast, to support the oversea operations of the Army, and generally to uphold and widen the political influence of Prussia. The idea in 1865 was to create a Fleet of the second class, whose object should be to protect Prussian and German commerce at sea, to defend the Baltic and North Sea coasts, and to assure the national interest in European affairs. The schemes of 1873 were based on the propositions that German commerce had increased greatly in importance, that Germans living abroad had been made Germans again (*wieder zu Deutschen gemacht*), that they were looking for German support in a manner which had not been anticipated in 1867, and that the maritime expansion of Germany was attracting far more attention from European States, which before had alone commanded the seas.

Uncertain and unstable policy.

It will be seen from these statements that, though ideas were abroad, there was no conception of how effect was to be given to them. The accession of the Emperor William II. to the throne on

June 15, 1888, promised the opening of a new era for the Fleet, and a great advance was made when the Fleet command was separated from the administration, and the Imperial Navy Office came into existence. But policy at the time was still neither sure nor stable. General von Caprivi, who was at the head of naval affairs from May, 1883, to July, 1888, had no clear idea of the object of the Fleet; and the same was the case with his successors, including even Admiral Hollmann, who was State Secretary for the Navy from 1890 to 1897. When the Law of 1888 was introduced, a partial remedy for this uncertainty was discovered, it being stated in the preamble that the Fleet must be a "sallying fleet" (*Ausfallsflotte*), to issue forth at opportunity, do what damage it could, and prevent a blockade, while cruisers on distant stations would afford protection "as far as possible." This was the first study, so to speak, of the famous preamble of the Law of 1900, wherein the calamitous consequences of defeat were pictured, and it was stated that Germany did not require "peace at any price, but peace with honour," and further that the German Fleet must be of such strength that even the mightiest Naval Power, by engaging in war with Germany, would prejudice her own supremacy. This statement was quite momentous in its consequences, because, for the first time, it assigned a definite object to the Fleet, and has given consistency to German naval endeavour ever since. It was the justification of the fixing of a naval establishment by law, and the assurance of its maintenance by means of a regular supersession of obsolete vessels. The remark may here be offered that obviously, upon the basis laid down, the establishment fixed in 1900 must have been considered variable, because of the variation of the establishments of other Naval Powers, and particularly of that of the "mightiest Naval Power."

The Emperor and the Navy.

The first sea officer who was chief of the German Admiralty was Admiral Count Monts, and in his time some ideas existed tending towards a Navy Law, but the only result was the building of the four ships of the Brandenburg class, which are now being replaced, and want of means forbade any wider plans. Two really great men stand behind German naval expansion—the Emperor William II. and Grand Admiral von Tirpitz. The Emperor realized from the beginning the importance of the Navy. He has been with it throughout its expansion, ever inspiring and encouraging it, and probably no monarch has ever been so closely identified with a fleet as he. "Our German Empire," he said, in January, 1896, "has become a world-empire. Thousands of German people live in all parts of the earth, and German products, German knowledge, and

German industry go out across the ocean. To you falls the earnest duty of binding firmly this greater Germany to the Germany at home." "Every day," he said at Potsdam in December, 1902, "shows us afresh that a prosperous development of the country without a corresponding operation of its sea power is unthinkable."

Grand Admiral von Tirpitz—his work.

It is a royal attribute of the German Emperor that he recognizes merit, and is able to select the right instruments for his objects. Whatever necessity there might have been for the creation of a great German Fleet, and whatever impetus towards it, there could have been no such development as has taken place unless the right man had been at the helm of naval affairs. There is no parallel in any other navy for the stupendous work undertaken and achieved by Admiral von Tirpitz. He had not only to create a new Fleet, but he had to create the means by which it might be created. These means were both moral and material—moral in the awakening of a national sentiment, in the overthrow of a dead-weight of national ignorance and opposition, and in the consistent direction of effort; and material in the practical development of a multitude of resources necessary for the work to be undertaken. Admiral von Tirpitz has not, of course, worked alone, for he possesses the genius which enables him to inspire his colleagues, so that his influence has been, as it is, wide spread. There has been neither requirement nor room for such an officer in the British Navy, which is the outcome of a long historical development and has centuries of experience behind it. Perhaps the nearest parallel to the work of Admiral von Tirpitz was that of Colbert, in his reorganization and regeneration of the French Navy; and possibly, when the history of the modern German Navy comes to be written, he may be styled the German Colbert. It may be, also, that in the regeneration of the Russian Navy the Minister may have to undertake and achieve a work that will be comparable to that of Admiral von Tirpitz.

Defective policy to be changed.

The Admiral was known to the Emperor long before he was called to office as Naval Secretary of State. In the time of Admiral Hollmann, Admiral von Tirpitz's memoranda on naval development had revealed the existence of a master-mind at work upon a confused problem. There were internal differences of opinion, men were holding appointments for which they were not suited, especially in the administrative offices, and there existed no policy which could give confidence to the Reichstag. There was a strong leaning also towards the idea of the French *Jeune École*, as expressed by Admiral Aube and Gabriel Charmes. Rarely has any movement,

undertaken with full confidence and high patriotism, ever operated so unfortunately as that initiated by the *Jeune École*. It proposed a cheap navy, and its doctrine was based on coast attack, commerce destruction, the bombardment of open towns, and the creation of vast flotillas of torpedo-craft and some gunboats. The result was such that the French Fleet became, through instability of policy, what one of its admirals called a fleet of samples, while great sums were expended upon torpedo-boats which never could have been of much use. It is doubtful whether the lesson was quite rightly read in Germany. At least it is clear that the opponents of naval expansion attached little attention to the threatened coast attack. But the tendency at work was shown in the multiplication of small coast-defence armour-clads, gunboats, and considerable numbers of defensive torpedo-boats—the perishable monuments of a misconception of naval policy. These ideas gained ground under General von Caprivi, but were perpetuated beyond his time. The result was that the Reichstag had no confidence in the policy of the Naval Department. The Social Democrats, the Freisinnige party, many National Liberals, and even the Centre became opposed to naval increases, and the attitude was intelligible. It was supported by a large part of the electorate, which had no conception of naval affairs, and the consequence was that year after year vessels proposed by the authorities were struck out of the Estimates by the Reichstag.

The Admiral's remedy—objects of the Fleet to be defined.

It was evident to Admiral von Tirpitz that the only remedy for this state of things was a Law which should have a tangible object, and should remove from the Reichstag the power of interfering with expansion. To him alone must be ascribed the conception, character, and execution of the Navy Law, and he carried it through in despite of the stoutest opposition, not only from some parties in the Reichstag, but in the Government itself. It was a primary necessity to focus, as it were, the national outlook upon the naval question, and to bring before the public in visible form the necessities which were declared to exist. Volume after volume appeared demonstrating the growth of industries, commerce, exports and imports, emigration and colonies, and showing the rapid growth of foreign fleets, which were regarded as a menace to German interests. *Altes und Neues zur Flottenfrage* and *Neue Beiträge zur Flottenfrage* (1908) were two volumes compact of facts, figures and arguments from the pen of "Nauticus" (whose personality is not obscure), which were followed by the "Nauticus" series inaugurated in 1909 and continued ever since. *Die Seeinteressen des Deutschen Reichs*, which belongs to the same period, was one of a number of semi-official volumes, issued *auf Veranlassung des Reichs-*

Marine-Amts. The German Navy League, unlike a similar institution at home, always supported the plans of the Naval Department, and thus contributed largely to the stimulation of public opinion. By these and other means the commonwealth of letters and learning, the leagues, the parties, and the educated classes generally were aroused to a knowledge of the situation, and the Navy Law was accepted by the Reichstag, though not without some concessions, and though denounced by those who objected to a continuous programme as an *Aeternat*.

Three principles conceived by Admiral von Tirpitz are embodied in the Navy Law. There is first the principle of fixing a definite establishment of ships, officers and men, to be reached and maintained, and with this a legal enactment of the conditions in which ships are to be kept in commission. The second principle, which is consequent upon the other, is the automatic regulation of the obsolescence and replacement of ships. The third and really informing principle is that which was known as the *Risikoprinzip*—the principle of risk—implying that the German Fleet shall be so strong that no enemy shall attack it without risk. It is claimed that in this way the Fleet fulfils its defensive duty as the premium upon the national interests which are to be protected. The *Risikoprinzip* is embodied in the well-known phrase in the preamble of the Navy Law. The three principles of the Navy Law.

But there is another feature of the Navy Law to be discerned in the tactical ideas which are embodied in the organization it legalizes. These ideas may be traced back to the Caprivi time, and Admiral von Tirpitz was much occupied in such matters during his service prior to 1897. Many other officers have, of course, theoretically and practically, developed ideas on the subject. The dominating principle, which Admiral von Tirpitz has constantly urged in the Budget Committee of the Reichstag, is that there shall be a battle fleet, consisting of certain squadrons of particular strength, with a fleet flagship and a reserve—which latter has for a time and a special object been abandoned—together with cruiser groups as scouts; also certain armoured cruisers, which by the development of types have inevitably become Dreadnoughts; and small cruisers and destroyers, to be built in a particular relation of numbers. The submarine has come later, as have the Zeppelin and the aeroplane. The essential point is that an end has been put to uncertainty and instability, and to the building of vessels for coast-defence purposes only. Tactical organization.

It is not intended here to say anything about successive changes and amendments in the Navy Law prior to 1912. A tabular Amendments.

statement showing the Laws of 1898 and 1900, and the amendments to the latter, will make the matter sufficiently clear.

——	1898	1900	1906	1912
Fleet Flagships	1	2	2	1
Battleships	16 (2 squadrons)	32 (4 squadrons)	32 (4 squadrons)	40 (5 squadrons)
Coast-Defence Ships	8	*Nil*	*Nil*	*Nil*
Battle Fleet Cruisers:				
Large	2	4	8	12
Small	8	16	24	30
Foreign Service Cruisers:				
Large	5	10	8	8
Small	5	10	10	10
Material Reserve:				
Battleships	2	4	4	*Nil*
Large Cruisers	1	2	4	*Nil*
Small Cruisers	2	4	4	*Nil*

The amendment of 1908 did not add to the establishment, but, by legalizing an earlier replacement of battleships—after twenty years instead of twenty-five—it made necessary the laying down of some additional ships.

The new organization.

The general effect of the amendment of 1912 is to institute an establishment of forty-one battleships, twenty large cruisers, and forty small cruisers, with a proportionate increase of officers and men. By doing away with one Fleet flagship and absorbing the material reserve, five battleships are secured for the new Fifth Squadron, and three others are to be laid down—one in 1913, one in 1916, and the third at a date not yet determined. A similar arrangement is made in the case of the small cruisers. The establishment of destroyers is 144. The actual effect of the amendment is to give the Active Battle Fleet twenty-five battleships, eight large cruisers, and eighteen small cruisers, being increases in these classes severally of eight, four, and six vessels, while the Reserve Fleet is reduced from nine battleships to four, from two large cruisers to one, and from six small cruisers to three. By these changes the actual numbers in full commission are increased by three vessels of each class.

The German High Seas Fleet as reorganized will consist of three Battle Squadrons, with a Fleet flagship, eight large cruisers, and eighteen small cruisers, all in full commission. One quarter of the Reserve battleships and cruisers will be in commission, with full complements, and there will be nucleus crews for the others, in the proportion of one-third of the engine-room *personnel* and one quarter of the other ratings. One object of this arrangement is to increase the immediate readiness of the Fleet, which was being reduced, so far as the mobilization of the Reserve was concerned, by the growing

complexity of the ships and the difficulties attending training. But a still more important purpose is to do away with, or reduce, the difficulty which has been caused by the withdrawal each autumn of about one-third of the complements of all the ships of the High Seas Fleet (being the short-service men) and the substitution of untrained men, whereby the effective value of the Fleet has for some months been impaired. These short-service men (the rest being volunteers for longer service) will, presumably, henceforth be mostly drafted to the Fifth Squadron and the Reserve ships for training, so that the work of four squadrons shall go on uninterruptedly. The actual procedure to be adopted has not, however, been explained.

Increase of *personnel*.

A considerable increase of the *personnel* will be required by the year 1920, as will be seen by the following table, but it must be observed that men are to be taken for the lower deck at the rate of 500 men per annum above the average, for the years 1912–14, after which the numbers added yearly will be reduced.

	Total additions, 1920.	Yearly average.	
Executive Officers	433	48	The additional Executive Officers are 2 Vice-Admirals, 1 Rear-Admiral, 12 Captains, 75 Frigate and Corvette Captains (Commanders), 81 Senior Lieutenants, 177 Lieutenants, and 85 Sub-Lieutenants. The Engineer Officers include 41 Chief and Staff Engineers.
Engineer Officers	116	13	
Medical Officers	57	6	
Medical subordinates	175	19	
Paymasters	67	8	
Clerks	119	13	
Warrant Officers	291	32	
Petty Officers, etc.	2,866	318	
Men	11,153	1,240	

Other features.

From what has been said it will be seen that the latest amendment to the Navy Law is a consistent step in the direct line of the policy adopted. The Fleet is to be organized completely in every part, both in personal and material respects, and is to be brought nearer to mobilization, and made, as far as possible, independent of the incursion of the three-years' men each October. No doubt the aspiration is to increase the proportion of long-service men who, through the several depôts or divisions, provide the petty officers and warrant officers of the Fleet. The abandonment of the material reserve is a measure of expediency and not of policy. It is considered that a lesser advantage has been sacrificed for a greater, and perhaps it is improbable that any proposals will be brought forward to build ships for the reinstitution of this reserve. But, as new battleships and battle-cruisers are completed and join the active squadrons of the High Seas Fleet, they will relieve others which will join the Reserve, and thus a material reserve may be built up of

vessels not of the most modern classes. This is the procedure in other navies, and seems to be the natural line of development in Germany.

Finance. The great demands that are being made for military purposes may have the effect of restricting further considerable expenditure upon the Navy, at least for a time. This, perhaps, is the explanation of no date having yet been fixed for laying down the third battleship and the two small cruisers which are necessary to give full effect to the organization as remodelled. The following are, in round figures, the sums officially stated as representing the cost of the recent amendment to the Navy Law for the years 1912–1917: 1912, £734,000; 1913, £1,370,000; 1914, £1,859,000; 1915, £1,908,000; 1916, £2,104,000; 1917, £2,055,000; total, £10,030,000 for the six years. To this sum must be added a further half million, spread over five years, to meet additional charges for *personnel*, making the grand total £10,530,000. The sum included for shipbuilding and armaments, including submarine boats and airships, is £5,480,000. It is not without interest to note that during the years 1913–1915, the additional charges involved by the new Army scheme have been estimated at a figure of at least £50,000,000. It thus becomes possible to appreciate in some degree the great burden of additional armaments in Germany. The figures must, of course, be regarded as approximate and subject to variation. The total sum of the Navy Estimates in 1913 is £22,887,870, being an increase of about £423,184. Large additions under the head of permanent (*fortdauernde*) expenditure and votes for naval construction (*einmalige*) are met in great part by a reduction of about £1,500,000 in the extraordinary expenditure.

This outlay for the Fleet is the practical financial result of the spirit informing the Navy Law, which is the subject of the present chapter. When we reflect that in 1871, the year after the war, the German Navy imposed no greater burden upon the country than £1,200,000, that ten years later the cost was still only £1,350,000, that in 1891 it was £4,270,000, and in 1901, after the passing of the Navy Law, £10,280,000, and that within the past ten years the expenditure has more than doubled, we are able to appreciate the magnitude of the task undertaken and achieved. In the times when there was no settled policy the Reichstag dealt harshly with the Estimates, especially with the shipbuilding votes, but now, with an object well in view, and confidence in the authorities assured, the vast sums are voted with scarcely a comment. *Qui veut la fin veut les moyens*, say the French, and that is the secret of the creation and growth of the modern German Navy. JOHN LEYLAND.

CHAPTER VIII.

The Progress of Naval Aeronautics.

The first steps towards equipping their aerial squadrons have now been taken by the principal Naval Powers. Germany in particular has been quick to see how admirably suited to her purpose are air-craft of an offensive type, and with great steadiness of purpose and determination, in the face of repeated disaster to her early vessels, has continued strenuously to evolve her rigid airships. This activity on the part of Germany has led to the development in Great Britain of air-craft of an offensive-defensive type—hydro-aeroplanes, and a series of stations for these craft are being established round the coasts of the British Isles. Intermediate between the two types of air-craft above-mentioned there is the non-rigid airship, which has been considerably developed on the Continent, and with which some trial has been made in Great Britain.

For the purposes of this article, these three types may be classified according to their respective functions on similar lines to sea-going ships—

(1) Torpedo air-craft (aeroplanes, hydro-aeroplanes, flying boats).
(2) Scouting and mine-laying airships (non-rigid airships).
(3) Battle airships (rigid airships).

Though the construction and functions of these types are generally well known, it may not be out of place to give a short description of each, with the armament they carry, and the duties they may be expected to perform in war.

Flying boats.

Both monoplanes or biplanes are at present in use as torpedo air-craft, and as far as the wings and the engine are concerned do not differ from the ordinary aeroplanes in use ashore. For naval purposes, however, the under-carriage is modified considerably. It is possible to remove the wheels of an ordinary machine and secure floats in their place, but this does not make either a neat or light job, and the usual practice is to build the floats on to the structure. Several satisfactory types of floats are now in use, one of the best having two long narrow floats set well apart, a system which gives good lateral stability on the water. In another system there is a single large float placed centrally, with two smaller supplementary

floats under the wing tips, to prevent these dipping under water should the machine over-balance. Some hydro-aeroplane builders have replaced this central float with a good-sized boat, and in some cases the passenger, pilot, and engine are placed in this boat with, on the whole, fairly satisfactory results.

Torpedo air-craft.

The functions of all the heavier-than-air types of machines are analogous to those of sea-going torpedo craft. It may be expected that the best machines will be capable of flying at a rate of 60 miles an hour with a 100-H.P. engine, and of lifting a load of some 900 lb. The figures may, of course, be varied. Greater horse-power or less may be used with a corresponding increase or decrease in the fuel required, and so on. But these figures have been taken as being typical of machines now being built for various Powers. If, then, the consumption of fuel is taken to be 0·7 lb. per H.P. hour, a good idea may be obtained of what air-craft of this type are capable of doing. Two men will weigh about 250 lb. Wireless equipment for 100 miles range requires 100 lb. Thus 550 lb. remains to be used as desired.

If all this can be utilized as fuel, the vessel can stay, approximately, eight hours in the air, which is equivalent to a distance of 480 miles. If floats are fitted for resting on or rising from the water, they will weigh from 200 lb. to 400 lb., and the amount of fuel, which means radius of action, or other weights, must be reduced accordingly. If the average weight of the floats is taken as 300 lb., this will allow of about three and a half hours' flight with two men and wireless equipment, or a radius of action of about 100 miles under these conditions. If, however, floats designed to let the machine descend on the water only, and not capable of rising from it, are fitted, the weight can be much reduced. Such floats will weigh about 100 lb., therefore allowing 450 lb. of fuel to be carried in addition to wireless equipment and two men. The vessel will be able to remain about six and a half hours in the air and have a radius of action of some 200 miles. Instead of a portion of this weight of fuel it may be desired to carry a gun or explosives, and, if so, for every 70 lb. of weight of this material one hour's fuel must be sacrificed.

Torpedo air-craft should carry the armament suited to the work on which they are employed. Thus for purely scouting duties no armament need be carried. For action against other aerial torpedo craft, and possibly against scouting and mine-laying airships, a gun armament would be necessary. Whilst for action against battle-airships, submarine boats, and for attacks on Naval bases, etc., a torpedo armament will probably be found most suitable. This armament consists of small mines to be dropped, or discharged from a

tube, or of an explosive charge which may be towed on the lines of the old Harvey torpedo. The last-named plan is expected to give the best results.

Torpedo air-craft can be used to assist the port defences and for patrolling the coast between their different bases. They may also be carried in ships, just as second-class torpedo-boats were carried in the Anson class of battleship, or in special mother ships in a similar way to that in which the torpedo-boats were once carried by the Vulcan.

One of the principal functions of torpedo air-craft will, it may be presumed, be the denial of certain areas to the enemy's air-craft, and whilst it is doubtful if they can do this unless they are in great numbers, and the enemy attacks in the daytime, still, they can assure that if he comes at all he must come in force, and at considerable risk to himself. For this purpose a mixed gun and torpedo armament would have to be used, for whilst the gun is a most effective weapon for use against other torpedo air-craft, and against scouting and mine-laying airships, it is, as will be shown later, practically useless against the battle airship.

Possibly one of the most useful employments for torpedo air-craft will be that of locating and attacking submarines, for which purpose they should be particularly suited. It is easier for air-craft to locate submerged objects than it is for surface craft to do so, and the submarines may then be attacked by dropping small mines on them. Probably 20 lb. of explosive, if dropped within a certain limit, would be enough, but as weights up to 300 lb. have been dropped from aeroplanes there will be no difficulty about increasing the charge if necessary. Somewhat similar methods must be used for attacking the battle airship, but here the air torpedo craft is in a similar position to surface torpedo craft attacking a battleship using a very short range torpedo, and her chances of success are similar.

Mine-laying and scouting airships.

Air-craft of the second class consist of a gas-bag made of balloon fabric, to which is suspended the car carrying the engines and crew. In order to keep the gas-bag distended so as to enable it to be forced through the air, it is necessary to keep a pressure inside it, and should this pressure be lost for any reason the ship immediately becomes uncontrollable. The method of doing so is to place ballonets, or air-bags, inside the gas-bag, and these are kept distended by means of a blower in the car. It is manifest, therefore, that this class of ship is very vulnerable, and that any damage to the gas-bag will put the vessel out of action.

It is true that the gas escapes but slowly from holes of the size of rifle bullets, and that even with 100 bullets through her skin the

vessel might still remain in the air for an hour or two, and then descend without damage to the car and crew, but any lengthy cruise would be out of the question if she were thus injured. If the pressure in the gas-bag in this class of airship should be rather high when she is struck by a small shell, there is a possibility of the hole enlarging and becoming a tear extending the whole length of the ship, and this damage would, of course, destroy her at once. Again, this class of vessel is particularly liable to attack from incendiary shells, whilst it is only necessary for an aeroplane to trail a piece of barbed wire over her to destroy her.

This class of ship can carry wireless apparatus of long range, and an armament of machine guns. The battery may be placed in the car and also on the top of the gas-bag, where a platform may be constructed to carry a gun which is reached by a ladder passing through a tube into the car. The successful solution of the problem of carrying guns upon an airship which can fire directly upwards has finally disposed of the argument that an airship is helpless when attacked by aeroplanes if they get above her. The advantages of this type are that they can be cheaply and quickly built, can carry large loads for long distances, and can be easily dismantled and packed for carriage, the parts being readily assembled again for use.

The Parseval type.

A typical ship of the Parseval type, such as the one ordered for the British Navy, and similar to those in use on the Continent, on a displacement of 10 tons can lift 7500 lb., and has, with engines of 400 H.P., a speed of 42 miles per hour, or 37 knots. Wireless apparatus will require 300 lb. for a 300 miles range, and 200 lb. must be allowed for landing ballast. A crew of eight men will weigh approximately 1000 lb., leaving 6000 lb. for disposal. Engines of 400 H.P. require 280 lb. of fuel per hour when running at full speed, so that if all the weight is put into fuel she can do twenty-one hours at full speed, equivalent to 777 sea miles. Like a sea-going vessel, the airship does not always require to go at full speed, and if half power be used she can do forty-two hours at 30 knots, an equivalent to 1260 sea miles, or with quarter power for eighty-four hours at 23·4 knots, which would be equivalent to 1965 sea miles. It is manifest then that a ship of this class could easily carry 1½ tons of explosives on a raid against a port 300 miles away from her base. A tremendous amount of damage might thus be done to floating docks, oil stores, dockyard workshops, and the like by a few ships making a simultaneous night attack.

This class of vessel is also admirably adapted for attacking submarines, provided the latter are not armed with guns; but in the face of hostile battle airships they will always have to work by

stealth and, if possible, in the neighbourhood of friendly guns, to which they can run for support if attacked.

Battle-airships.

The main feature of the battle airship type is a metal or wooden skeleton hull. Inside this framework are the gas-bags, generally seventeen or eighteen in number, whilst on the outside is an outer cover, with a space of 8 inches or a foot between the two. This double bottom, or "ring space," as it is more usually called, may be filled with non-flammable gas, such as the exhaust from the motors, and so make it impossible to set the hydrogen in the gas-bags alight by means of an incendiary shell. The ship is, as it were, protected by a non-explosive, non-flammable layer of gas-armour.

All parts of the ship and the gas-bags can be reached by the crew, provided they are equipped with some apparatus for breathing, such as is used in rescue work in coal mines, so that damage done can be made good as it occurs. Again, the gas in the gas-bags is not under pressure, as it is in the non-rigid type of ship, so that even if a hole is made it escapes very slowly. A rigid airship of modern type can get an upward thrust equivalent to the dropping of over a ton of ballast, by pointing the bow upwards and going full speed ahead. It will be seen, therefore, that these ships can stand a lot of damage without being put out of action.

German L1 type.

The latest ships of this type, such as the last one delivered to the German Navy, have a displacement of some 22 tons, and engines of 510 H.P., giving a speed of 45·7 knots, or 52 miles per hour. The engines at full speed require 357 lb. of fuel per hour, and the vessel will carry a useful load of 14,000 lb. If 2000 lb. is allowed for crew and 1290 lb. as ballast and spare, there will be 10,710 lb. left for fuel, enough for 30 hours at full speed, or the equivalent of 1471 sea miles, or if proceeding at half power, 60 hours at 36 knots, equivalent to 2160 sea miles. It is thus easy to work out how much weight can be devoted to armament when it is known what her duties are to be. The armament of the German battle airship that has been taken as an example is understood to consist of two 1-pdr. automatic guns and four Maxims, an armament which should not reduce her radius of action by one-sixth.

It it interesting to note that, for every 1 per cent. of the total weight of the ship dropped, it may be taken that she will rise 260 ft. Thus, in a 22-ton ship, such as the German vessel, dropping 1 ton will cause her to ascend to a height of 1170 ft., so that by the time she has used her 10,710 lb. of fuel she will have reached 5668 ft. The upward thrust she can obtain from her engines, which is at least 1 ton, will take her up another 1170 ft., whilst, if she dropped the 1290 lb. allowed for ballast, she would gain another 600 ft. or so.

The total height thus attainable would be 7438 ft. It is thus possible to ascertain how high an airship can ascend at any period of her voyage, noting that she can vary her natural height over 1000 ft. either way by the use of her engines and rudders alone. That this method is a good rough guide is shown by the fact that the height actually attainable in the circumstances detailed is just over 7600 ft.

Floats for hydro-aero-planes. It is extremely difficult to differentiate between air-craft for Naval purposes and those intended for Military use. For instance, now that a satisfactory design of float has been found, these can easily be made in large numbers and attached to any aeroplane in the course of a day or two. So that in reality all military machines and their pilots are available for Naval use at very short notice, and *vice versa*. It is practically impossible to ascertain how many aeroplanes are actually in the possession of the Naval authorities of any country. Experiments are continually going on, and experimental machines being constructed. Ordinary aeroplanes are temporarily fitted with floats and then restored to their original form. In the following pages only the aeroplanes actually fitted with floats, or immediately available for fitting with floats, are mentioned, that is those actually in the possession of the Naval Authorities, and including the machines used for school purposes on shore.

All airships are immediately available for Naval use without alteration, whether they are in the possession of the Naval or Military authorities. There is no doubt that in a Naval war, if it were desired, all airships in the country could be used to attack a hostile base or capital. Military airships can be used with a fleet by adding a few Naval ratings, accustomed to the system of signalling used at sea, to supplement the ordinary crews.

The navigation of airships is similar to that of sea-going ships, whilst the handling is similar to that of submarines. Big airships require as delicate handling and as much skill to get them in and out of their sheds as is required to get a large warship in or out of dock. In fact, an airship is a "ship" in every sense of the word, and requires treatment as such, and the qualities demanded of the men that man her are those of sailors, whatever they may be called, and under whatever authority they may be placed.

Having now described the three classes of air-craft and their chief characteristics, the next step will be to show what advance each of the principal Powers has made towards the provision of a fleet for air fighting. In this connection it is necessary to remember that the work to be performed is not primarily the same for all nations, and that what may be most suitable for a Continental country, with

extensive land frontiers and a big army, may not be the best adapted to the needs of the British Empire, with a widely differing problem of defence. Moreover, here the matter dealt with is the assistance which air-craft can give to the Navy, and it is the development of air-craft for service oversea that has been mainly kept in view. These limitations have been borne in mind in the compilation of the following facts concerning aeronautical progress.

Great Britain.

British torpedo air-craft.

Experiments in this country, on the Naval side, with aeroplanes, or, as they are here called, torpedo air-craft, have, up to the time of writing, been mainly restricted to the problem of finding a satisfactory means of starting them from the water and from a ship, and of alighting on the water. The first successful results were obtained in Cavendish Dock at Barrow-in-Furness, where experiments were carried out by some officers of H.M.S. Hermione during the summer and autumn of 1911. The machine used was a tractor biplane purchased by one of the officers. A large number of experiments were carried out with different forms of floats, and on November 18, 1912, the experiments were brought to a successful conclusion, the aeroplane rising from the water with an engine of lower horse-power than any used elsewhere. This machine, with her different forms of experimental floats, was eventually purchased by the Admiralty. At the same time that the experiments at Barrow were going on, similar experiments were being carried out privately by two gentlemen on Lake Windermere, and were brought to a successful conclusion two days after those at Barrow. Meanwhile, an aeroplane piloted by one of four officers undergoing a course of training at Sheppey—where, at Eastchurch, the first naval school was established—was successful in alighting on the water.

Later on, experiments were carried out in starting from a ship. A platform was rigged over the fore barbette of the Africa, and, extending over the bows, sloped downwards. No difficulty was found in getting away from this platform, and the experiment was afterwards repeated from other ships. It is not a very satisfactory way of starting machines, as the platform is fairly substantial and not hastily removable, and it masks the foremost guns, but no difficulty is foreseen in making it lighter and more portable. Various hydro-aeroplanes, either built for or acquired by the Admiralty, have made successful flights along the coast, notably on the occasion of the King's visit to Weymouth and the Portsmouth review on July 9, 1912, when the machines were flown from Eastchurch and back.

On May 15, 1912, the Royal Flying Corps was started with a Naval and a Military wing, but with one common school, called the Central Flying School, of which the first commandant was a Naval officer. During the military manœuvres in September four Naval pilots took part, flying their machines from the headquarters to the manœuvre area and back again. At the beginning of 1913 the second Naval air-station was established, being on the Isle of Grain, in the estuary of the Thames. Other stations are in course of construction at various points along the coast.

The Navy possessed, in the early part of 1913, some twelve hydro-aeroplanes of various sorts, and some thirty or forty other aeroplanes for school and experimental work, and most of the latter could be adapted for sea work in a very short time. In the aeroplane section of the Naval wing of the Royal Flying Corps there were seventeen officer-pilots, two warrant officer-pilots, and several pilots of various ratings from the lower deck. In addition, there were a number of officers who had their pilot's certificates, but who had not yet been selected for the Flying Corps.

British scouting and mine-laying airships.

With the type of vessel in the second category of air-craft little was attempted last year, so far as the Navy is concerned. In August, 1912, a Naval Airship Section of the Royal Flying Corps was formed and a small airship for training purposes acquired, capable of carrying two men for a short time. An airship of some 8 tons was ordered in France, and another of 10 tons displacement in Germany, both these ships to be delivered in the spring of 1913. The Naval Airship Section has, however, had the benefit of training in the Army airships and of attending the military manœuvres in them.

The military wing, Royal Flying Corps, has one airship, the Delta, of some 5½ tons displacement and a speed of 44 miles an hour for 14 hours, or 38·7 knots, and it is understood that a somewhat similar ship has been ordered. They have also the Gamma, which might in an emergency be used for port defence, but her low speed of 27 knots makes her useless on many days of the year. The Beta is of no use at sea, as she has only one engine.

The Naval Airship Section in March, 1913, consisted of one Commander, six Lieutenants, one Warrant Officer, and some thirty men. There were also three Lieutenants under training.

British battle airships.

The construction of the first battle airship for the British Navy was begun by Messrs. Vickers, Ltd., at Barrow-in-Furness in 1910. She was launched in May, 1911, and immediately began a series of mooring experiments while lying for four days made fast to a post in Cavendish Dock. During this time winds of a strength up to

45 miles per hour were met with, and the airship behaved perfectly. There is no reason to suppose that she would have experienced any difficulty in much stronger winds. These experiments may be considered of the greatest importance, as in Germany most of the troubles have been experienced with the airships on the ground. After the expiration of four days the vessel was taken back to her shed, as, owing to this being the first experimental ship, it was found that she could not maintain her speed of 41·3 miles an hour for twenty-four hours without being lightened. This was accomplished by the removal of her fore and aft bridge and by other minor alterations, when she was again taken out in August, 1912. Unfortunately she met with an accident whilst being brought from her shed, and was taken back again in a seriously damaged condition. The finding of the Court of Inquiry into the cause of the accident has not been made public, except that the officers concerned were absolved from all blame. British Naval No. 1 type.

There is no doubt that if the ship had been reconstructed, or another built immediately, the lesson learnt would have been of the greatest value and well worth the cost involved. This accident is really a more serious matter for the Empire than appears at first sight, as it put back the building of our aerial battle-fleet for several years, and gave to other Powers a lead. Not only was much valuable experience that might have been gained with this most important type of ship lost, but all the workmen who had been carefully trained to the special type of work required in their building were dispersed, and some day it will all have to be begun again.

Airship sheds.

It is not generally realised what an important part proper sheds play in the building of large rigid ships. Aeroplanes and the non-rigid type can be built almost anywhere, as they do not take up a great deal of room during construction, but a rigid vessel requires a large amount of protected space from the time she is laid down. In this country there is at present only one shed of sufficient size to build a battle airship in, and that is not very suitable, while when she was completed there would be nowhere to put her in order to admit of a second vessel being laid down. Germany has foreseen this and has eighteen sheds at least, many of them capable of holding two ships. A contract has been placed for a second shed for the British Navy, but this cannot be ready for about a year. It would appear to be a wise policy to proceed with the building of several sheds at once, so that when a decision is eventually arrived at to provide an adequate aerial fleet the speedy construction of it will be possible.

In introducing the Navy Estimates for 1913–14, the First Lord

stated that a sum of £321,000 would be spent this year on naval aeronautics, being the largest sum that could be expended without waste. Additional airship sheds are to be built, and when they are ready more airships will be ordered. Meanwhile, negotiations were in progress with a British firm for building battle airships. The chain of torpedo air-craft stations was to be extended. A total of about £850,000 will be expended on aeronautics by the Army and Navy combined.

The scheme of organisation of the Naval Air Department is shown in the current official Navy List.

Germany.

German torpedo air-craft, mine-laying and scouting airships.

This class of air-vessel has not been developed to any great extent, although the authorities are giving aeroplanes every encouragement by offering prizes at meetings, etc.

In the spring of 1913 a large Naval air station of over 12,000 acres was opened at Cuxhaven, and there is a hydro-aeroplane station at Putzig on the Baltic. The Germans seem determined to build up their own aeroplane industry and do not buy abroad to any great extent, so rapid developments may be expected as soon as satisfactory native types are evolved. A Naval air station is being established at Heligoland, and probably it will include a torpedo air-craft base.

Of non-rigid vessels Germany has a good number. It may be taken that all those with a speed of less than 40 knots are of little use for oversea work. None of these ships are appropriated to the Navy, and some are private ships, but if required for service with the Fleet they are no doubt available. Practically all are of use for a raid on a Naval port or such-like enterprise, provided a suitable wind is awaited and it is not expected to see them back again. On about 230 days of the year the wind is below 30 miles an hour at 1500 ft., and close to the ground it is about half this velocity, so that the large ships of this type are capable of reaching British shores and returning home on many days of the year.

The following detail of foreign ships is mainly taken from *Aeronautics*:—

Military airships over 30 knots:—

2 Parsevals, P3 and P4, built 1911 and 1912. Displacement, 10 tons; two engines, 200 H.P., 400 H.P.; total speed, 37 knots; load, 7500 lb.

1 Parseval, P2, built 1911. Displacement, 8 tons; two engines, 150 H.P. each; speed, 34·3 knots; load, 5600 lb.

Siemens-Schuckert, SS., built 1911. Displacement, 15 tons; four Daimler and two Benz motors, total 650 H.P.; speed, 40·5 knots; load 10,000 lb.

1 Gross, M3, built 1912. Displacement, 7 tons; four motors, total 300 H.P.; speed, 33·5,

Privately owned—over 30 knots.

1 Parseval, PL12, built 1912. Displacement, 8 tons; two N.A.G. motors, 220 H.P.; speed, 32·5 knots.

There are in addition to the above three Military airships with speeds of less than 30 knots, and of which one has only a single engine, and nine privately owned ones, of which four have only one engine, and these may be considered unsuitable for oversea work in consequence, leaving five ships possibly available for mine-dropping attacks.

German battle airships.

The battle airships of Germany are of two types, the Zeppelin and the Schütte-Lanz. The former consists of an aluminium hull, or, probably, some alloy of aluminium in the later vessels, to which the cars containing the engines are rigidly connected, the propellers being carried on the hull itself and driven through flexible gearing by the engines in the cars, so bringing the thrust nearly in line with the centre of resistance. Seventeen or eighteen gas-bags are contained in the hull. A cabin is placed about half-way between the cars carrying the engines, in which are the wireless instruments, explosives or passengers. Some notable voyages have been accomplished by ships of this type, including one of 1000 miles in thirty hours. The Schütte-Lanz type has a wooden hull, to which the cars carrying the engines are flexibly suspended. The advantage of the flexible suspension is that should the car bump the ground the shock is not conveyed to the framework of the ship.

The Naval authorities possess one battle airship, and the Military five, of which the earliest, built in 1906, may be considered too small for oversea work, except with the mine-laying squadrons, and there are two in private hands, available for use if required, which appear to be used as training-ships on occasion. The military airship Ersatz Z1 was unfortunately wrecked on March 19th, after an eighteen hours' flight. She was then short of petrol, and made a descent on the drill-ground at Karlsruhe, where there were no proper mooring appliances. Struck by a violent gust of wind, she broke up, and was destroyed before she could replenish her stock of fuel and take to the air again. The lesson drawn from this event in the German Press was that larger ships, with increased radius of action, are desirable, and that more mooring places should be provided. There are building for the Navy two larger battle airships, and two more have been ordered. These are of the Zeppelin type. The Military have one Zeppelin type and a Schütte-Lanz under construction and two more ordered.

With great foresight, the Germans have provided themselves with a large number of good sheds; there are eighteen over 450 ft. long, and many of these will hold two ships. They are thus in a position to build rapidly. So strong, in fact, is their position in this respect at the present moment that even if any other nation were to endeavour

to build a fleet of battle airships equivalent to the German one, absolutely regardless of expense, they could not do so in less than two years at the very least, one year being required to build the sheds and another the ships. These sheds are placed as follows: Berlin, Duisberg, Potsdam, Koenigsberg, Posen, Kiel, Hamburg, Düsseldorf, Leipzig, Cologne, Metz, Frankfurt, Mannheim, Baden, Strassburg, Gotha, and two at Friedrichshafen, while sheds are under construction at Cuxhaven, Heligoland, Breslau, Wilhelmshaven and Dresden. There is also a torpedo air-craft station at Putzig in the Baltic, and one at Cuxhaven. The accompanying chart shows the airship sheds of the European Powers, built and building, together with the radius of action of a battle airship at half power, a Parseval at half power, and a hydro-aeroplane.

On March 31st, the new German naval aviation proposals were published. There are to be two squadrons of four airships each, with one airship in reserve. All the ships will be based on one station, where there will be four double revolving sheds for the ships in commission and other sheds for the reserve. The airships will be replaced every four years. Experiments are also to be carried out with a new type of airship. The torpedo air-craft will have one central station and six subsidiary stations, with a total of fifty aeroplanes. The *personnel* is to consist of 1542 officers and men. The expenditure for 1913 is to be about £307,500, rising in 1914-15 to £1,000,000.

The Army is to spend about £4,000,000 on aviation, and new airships and aeroplane stations are to be provided. From the provision thus made the development of aeronautics in Germany promises to be even more rapid and complete than was expected.

France.

French torpedo air-craft, mine-laying and scouting airships.

Torpedo air-craft bases are being established at Nice, Dunkirk, Bizerta, and Bonifacio. The old torpedo-depôt ship Foudre is also used as a floating base and experimental ship, and a lake in the neighbourhood of Toulon is used for experimental and school purposes.

Of vessels of the second category France has a considerable number, but mostly slow ships of a somewhat inferior type compared to the German and Italian ones. The fastest, the Clement-Bayard VI., is only of 33·4 knots speed, and she is in private hands. There are six ships belonging to the Army of over 30 knots, the fastest of which is 31 knots. There are seven ships of between 24 and 30 knots in the hands of the Army. There are also five private ships,

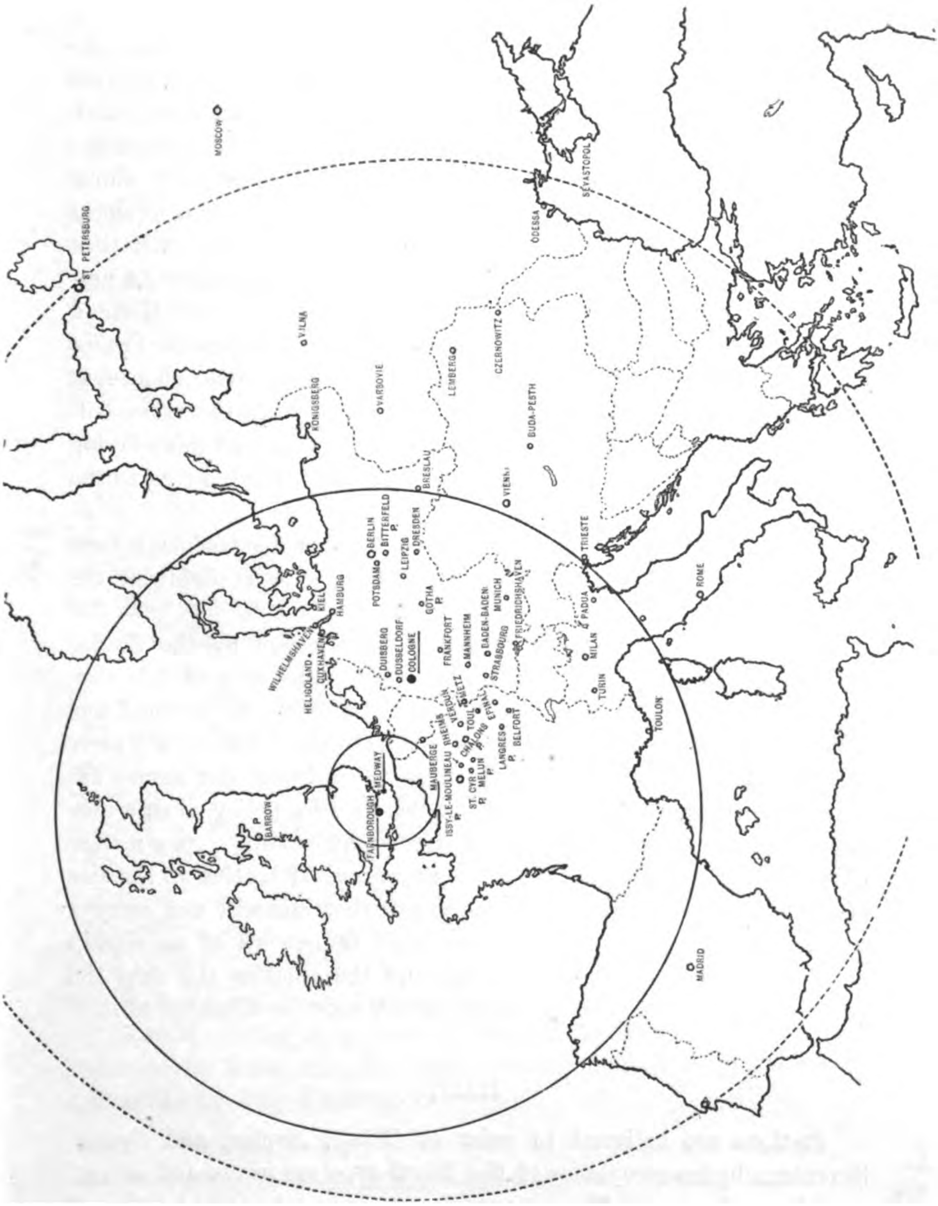


Diagram of Airship Stations.

P after a name means private—unsubsidised station.

The large circle shows radius of action of modern Zeppelin at half-power—about 36 knots speed—assuming her to be based on Cologne.

The small circle shows the radius of action of a hydro-aeroplane based on the Medway.

The third circle shows the radius of action of a Parseval type at half-power—about 30 knots speed—based on Farnborough.

including the Clement-Bayard above mentioned, the Trans-aerien, of 30·8 knots, and the remainder varying from 23·7 to 28·1 knots.

A serious effort is being made to improve the situation as regards this type of ship, and the money for five large vessels has been voted. The orders for four of them have been placed, and work on them has been started. They are to have a minimum speed of 39·6 knots, and will mount a gun on the top of the gas-bag over the foremost car. Their tonnage will be from 22 to 32 tons, and they will thus be as big or larger than the latest German battle airships. At first these ships seem to have been designed as a reply to the German battle airships, but it appears to be generally recognised in France that, owing to their vulnerability, they would have little chance in an action with the latter, and it now seems probable that they will be manned by naval crews and used for scouting and mine-laying purposes with the Fleet, for which they are well suited, owing to the large radius of action they will possess.

An additional seven airships of over 20 tons displacement have been ordered in 1913, but no further details were available at the time of writing.

French battle airships.

One small battle airship is under construction by the Zodiac Company. It is of 14·3 tons displacement, and a ship of this size, built on the rigid system, is not likely to be of much practical use, as it is too small. The building of small rigids is a very easy error into which to fall when the authorities who allocate the money are not technical experts, as it appears to them a wise policy when a new type of vessel is proposed to start with a little ship. As a matter of fact, it is like trying to build an experimental battleship the size of a gunboat and then being surprised that she will not carry a suitable thickness of armour, for the rigid framework of an airship may be looked upon as armouring, and the smaller the ship the greater the percentage of the weight which must be allocated to it.

ITALY.

Italian torpedo air-craft, mine-laying and scouting airships.

Stations are believed to exist at Genoa, Naples, and Spezia. Seventeen hydro-aeroplanes of the Bouel type are in use and several experimental types. Three Sopwith type have been ordered, and experiments are in progress with a native hydro-aeroplane.

Vessels of the second category are few in number, but very efficient in every way; in fact, the Italians may be considered second only to the Germans in their skill in building this type of vessel. They have evolved a type of their own, which embodies some of the good qualities of the rigid ship. A long, folding keel runs inside the

gas-bag. This keel can fold downwards for transport purposes, but not upwards, being designed on the same principle as the chain rammer. The gas-bag is divided into several compartments, and in each compartment is a ballonet of sufficient size to fill the whole compartment when blown out with air. Should the ship be damaged in one compartment, the ship will lose her shape and cease to be navigable, but the keel will prevent her doubling up. The ballonet is then blown out with air, the ship regains her shape and can carry on again, but, of course, with a smaller amount of ballast or fuel, corresponding to the amount of gas lost. It is possible that with a shell through one compartment the ballonet can be blown out fast enough to prevent her losing pressure to any serious extent. If this is so, it is a great advantage, as if the gun is fired from ship or shore, she can immediately proceed out of range, instead of having to remain in range to make good damages.

The Italian dirigibles are of three classes, but all on the above lines. The "P" type is small, under five tons, and of these there are at present five. The "M" or medium type are of 12 tons, and the "G" or large type will probably be of 20 tons and above. There are two ships of the "M" type and two of the "G" type under construction. It is the wise policy of the Italian Government to build their ships in pairs, as not only is it much cheaper than building odd ships, but if any accident befalls one ship the experimental work is not brought to a stop. All except the first ship built in 1907 have over 30 knots speed, and the latest of the "M" type, fitted with Wolseley engines, is of 42½ knots. The success of the Italians is partly due to the fact that they have learnt to utilise silk for their gas-bags, and they are the only nation that has been successful with this material, which has the advantage of being considerably lighter than ordinary balloon fabric. All the airships are built at the military factory near Rome.

Italian battle airships.

A rigid airship of 16 tons is believed to have been under construction for some time, but being rather small it is probable that difficulties have been met with.

AUSTRIA-HUNGARY.

Austrian torpedo air-craft, mine-laying and scouting airships.

A hydro-aeroplane station is being established at Pola on the Adriatic. As a beginning, four French hydro-aeroplanes of the Donnet-Levêque type have been purchased and have made some successful oversea flights. A considerable number of aeroplanes of German manufacture have been ordered, and some of these may be fitted with floats.

Of the semi-rigid type there is one Parseval of 2·3 tons and another of 10 tons (?); one Körting of 3·6 tons, speed 30·3 miles per hour, two motors; one Astra of 4 tons, and two larger (?); with another ship of 7 tons. Other details not available.

Austria-Hungary has no battle airships.

Russia.

Russian air-craft.

Some experiments with hydro-aeroplanes are believed to have been conducted at Sevastopol, but very little is known about Russian progress.

The mine-laying and scouting airships completed are seven in number: one Parseval of 6·7 tons, two N.A.G. engines, 110 H.P.; one Astra of 6·5 tons, two Pipe motors, 110 HP.; one Clement-Bayard type of 3·5 tons and 33½ miles per hour, and one Lebed of 3·7 tons, with three smaller. The following ships have been ordered, and are to be delivered in the spring: two Clement-Bayards of 10 tons; one Astra, 10 tons; two Zodiacs, 10 tons; and one Parseval, 10 tons. Each of these ships will carry an armament of four Hotchkiss machine guns.

Russia has no battle airships.

United States.

American air-craft.

The hydro-aeroplane was first developed into a successful type of air-craft in the United States; in fact, practically all the pioneer work was carried out there. The first experiments in starting from a warship, and also alighting upon one, were carried out there. A Naval hydro-aeroplane school has been started with a summer base in the North and a winter base in Florida, and a small number of aeroplanes have been bought for sea service. There are no other air-craft of any sort.

Further Progress.

British advance.

In regard to future development, it may be expected that a great advance will be made, especially in this country, as the coming of the air-craft may more profoundly affect Great Britain than any other nation. Hitherto the inhabitant of these islands has had the comfortable feeling that before he could be personally inconvenienced in any war in which his country might be engaged, it was necessary for the Navy to be defeated. The main protection must still be the Fleet and the Army, but the development of the air-craft for fighting and raiding purposes has made possible a danger of a different kind.

The public have not yet realised what this may mean to the non-combatant, because they have never had an opportunity of seeing a battle airship and very little of any other type.

Aeroplanes *versus* airships.

There is a general impression that the aeroplane is the antidote to the airship, and sufficient for the needs of our island, but this has not been proved. There is no doubt that for Army work, where scouting up to a distance of some 200 miles as a maximum is required, the aeroplane is most suitable, because it is easy of transport, and for patrolling narrow straits and stretches of coast-line the hydro-aeroplane will be very effective. There are many experts who doubt the power of aeroplanes, in whatever numbers, to stop half a dozen battle airships with their attendant mine-layers, just as it is doubted if the torpedo craft of the sea can annihilate the Dreadnought. It is the business of airships to remain outside the radius of action of aeroplanes by day and to attack by night or in thick weather. Owing to the clearness with which objects are visible from airships at night, it should not be difficult for them to locate their quarry, but whether their bombs will have much effect has yet to be determined by experiment. The Gamma passed over Westminster Bridge and within one hundred yards of the Houses of Parliament in a fog without being seen, though she was only about 200 ft. up at the time.

Limitations of air-craft.

The power of air-craft may be easily exaggerated. From the way in which some writers expound the subject it might be imagined that air-craft in the future must be omnipotent. There is no doubt that if we could make our water fleets fly we should be delighted to do so, because their great power would not then be confined to the sea and a narrow stretch of coast-line, but we should be able to use it to strike straight at the enemy's heart. Decisive battles are seldom or ever fought at sea. It is the successful sea action that makes the decisive land battle possible. What air-craft can do is to avoid water ships and do damage on land. But to subdue a country it is necessary to occupy it, or be able to occupy it, and it is not feasible that air-craft should be able to carry sufficient men for the purpose.

Air-craft can be of great assistance to a fleet in locating the hostile battle squadrons. They can carry out raids on dockyards and magazines. They may even threaten the destruction of a town or its principal buildings. To meet this air menace means the building of air-craft of all types and their consequent development. This development will probably mean increase in size for all air-craft for oversea purposes, except those that may be carried in ships. At present the weight of the floats in hydro-aeroplanes is a serious handicap, but the larger the machine the smaller need the weight of

the floats be in proportion, as with increase in size the displacement increases faster than the weight. Large floats are also more seaworthy.

The same principle applies to airships of all classes. The larger the ship the smaller proportion the weight of the hull bears to the total weight lifted. For technical reasons, which it is not necessary to go into here, the rigid airship gains more than the non-rigid when large ships are considered. It may be anticipated that before long experiments will be carried out to see if it is not possible to anchor air vessels like ordinary ships; and there seems no reason why they should not, if sufficiently heavy anchor gear can be carried. In order to carry this extra weight the size of the ship must be increased or the fuel capacity diminished. Then it is highly desirable that an airship should have high speed and large radius of action, not only for war purposes, but to enable her to ride out a gale in the air when it is too rough for her to descend, or to run away out of the storm's path. It is calculated that if the diameter of the latest Zeppelin were increased from 49 ft. to 60 ft. (the Schütte-Lanz is already of 60 ft. diameter), her length increased from 510 ft. to 625 ft., and she were engined in proportion, she would have a maximum speed of some 60 miles an hour, or 52·8 knots, and could maintain this for about forty hours; or if she proceeded at 30 knots she could steam for about 190 hours, provided all the weight she can carry was put into fuel. It is worth noting that the shed at the Zeppelin works at Friedrichshafen has been lengthened to 630 ft., so larger ships may be flying before the year is out.

Tabular lists of the airships of the six principal European Powers are given on pp. 303, 304, 305.

CHAPTER IX.

The Mid-Scotland Ship Canal: Has it a Strategic Value?

Carriage of goods by water is as old as the human race; there was probably never a time when rivers were not used for this purpose: later on in history it was seen to be advantageous to supplement Nature in this respect, and canals were dug and utilised. As far back as 1681 our neighbours in France completed the Canal du Midi, or Languedoc Canal, which connected the Bay of Biscay with the Mediterranean. This canal, which is 148 miles long, and rises 620 ft. above the sea level, was constructed with no less than 119 locks, and its depth was 6½ ft. It will be seen that the engineer, Baron Paul Riquet de Bonrepos, was a worthy forerunner of the men who deal with the huge problems of modern construction of water-ways.

The canal, however, in all the centuries that are past fulfilled two functions only: the first, and perhaps the more important, that of the carriage of goods; the second, that of irrigation, as we see it in use in Egypt, India, and elsewhere. Until quite recent times it had never taken rank as a strategical asset, something which a nation could use to assist in the discomfiture of its enemies. The most famous of all canals—that of Suez—can hardly be called a strategical canal, as it is neutralised by agreement and used indifferently by the warships and the merchant vessels of the entire world.

The Kaiser Wilhelm Canal.

The most striking example to date of completed canals, made in the first instance for strategic purposes, is the famous Kaiser Wilhelm Canal from Kiel on the Baltic to Brunsbüttel on the North Sea. Commercial advantage is here far to seek, but this had no influence with the rulers of the German Empire, to whom the money allocated for the construction of the water-way was only part of the whole expenditure that was to render Germany great and strong upon the sea. That it was emphatically well worth the doing is evident to anyone who takes a glance at the map, avoiding as it does narrow and tortuous channels easily mined and defended, and the passage through stormy and foggy seas around the Skaw back into

German waters. Eight millions sterling went to the construction of the Kiel Canal, and hardly was it completed when, by the construction of the Dreadnought, the water-way became obsolete. Seventy-two feet width of floor and a depth of 29½ ft. were no use for the immense battleships yet to be constructed in the Fatherland, but she did not hesitate to shoulder the fresh burden, and set to work to double the size of the just completed water-way. It cost another twelve millions sterling. It will cost year by year a considerable sum in mere upkeep. Considering where it is situated, it is never, perhaps, likely to return a dividend on the money expended. The dividend that it earns is the safety that it provides for German warships in their passage from sea to sea, the time it saves in passing them from one area of battle to another. When we consider this, he would be a bold man who would say that the money has been ill expended.

The Mid-Scotland Ship Canal.

It is probably known to all by whom this article is read that there has been an agitation on foot for a number of years past having for its object the construction of a canal through Scotland, that has come to be known as "The Mid-Scotland Ship Canal," and which has for its object the connection of the Atlantic with the North Sea from Forth to Clyde. The proposals with regard to the construction of this canal have been laid before the Royal Commission on Water-ways, the report of which body will be referred to later, and the Royal Commission submitted their views to the Committee of Imperial Defence, who made certain observations, to which it will be necessary also to go back.

It is claimed by those who advocate the construction of the Mid-Scotland Ship Canal that it will serve a strategic as well as a commercial end; that it possesses an immediate and actual strategic value; that in it reside potentialities for the increase and the fostering of trade.

Strategy and commerce.

Strategy and commerce are actually interdependent. It might be argued that the Kiel Canal had no trade value, and, as has already been said, translated into terms of hard cash, this very likely is the case. But that German ships should be safeguarded, a German Navy has been built; that that navy shall be ready for use in its highest effectiveness, the Kiel Canal has been constructed. The strategical asset serves the turn of the trader in this manner.

There can be no manifestation of the art of the strategist without the wealth earned by commerce; equally, there can be no commerce if the community be not prepared to resist the aggression of foes from without the boundaries of the State. The means to the end of the strategist are many and various, but if war be "an affair of positions,"

as it was declared to be by one of its greatest masters, then the man or the nation that does not take trouble to secure for themselves this priceless asset are guilty of an almost criminal negligence.

When the project of the Forth and Clyde Canal came before the public twenty-four years ago, it could then have appeared only in the guise of a legitimate commercial undertaking; its strategical value was practically *nil*. To-day, whatever its commercial value may prove to be, this will certainly be exceeded by its potentialities in the realm of strategy. In the war which is yet to come—the war for which preparations are being sedulously made elsewhere—one of the greatest difficulties with which any British admiral will be confronted is the protection of commerce in Home waters, the safeguarding of the ships that carry the foodstuffs across the Western Ocean. In the constricted waters of the Channel the principal danger will lie; it is this entrance that will be most difficult to guard. But if in the middle of Scotland there existed this great water-way, which could be attained without going near the danger zone of the Channel, the gain would be great. Then the enemy wishing to harass our commerce—that is to say, the ships coming from America—would have to pass Scotland north about, and would, when he gained his station, have the entire mass of a hostile country literally under his lee. On the other hand, defence of this route would be comparatively easy, from Lough Swilly, in the north, and Blacksod Bay, on the west coast of Ireland.

Fleet at Lamlash.

That which matters next to position is time—time that nowadays will have to be reckoned in hours, when in sailing days it might be reckoned in days. Lamlash Harbour is now utilised as a base for warships. Supposing that it became urgently necessary to transfer a fleet lying there to the Firth of Forth, let us see in what way they would benefit supposing that a battleship canal existed on the Loch Long-Loch Lomond route. The fleet lying at Lamlash would be only 40 miles from the cut in Loch Long—the entrance to the canal—and it is claimed by the promoters of the enterprise that a fleet could pass from the Cloch Lighthouse, which is opposite Dunoon on the Firth of Clyde, to about 3 miles east of Grangemouth on the Forth in eight and a-half hours.

In present circumstances the same fleet, to reach the Forth bound north about, would have to steam south from Lamlash, round Pladda Light and the Mull of Cantyre, thence north-westerly past Islay, proceeding at least 72 miles, cutting it as finely as possible, before the ships turned northwards to round Skerryvore and proceed by way of the Sea of Hebrides, Little Minch, and Minch, to Cape Wrath, another 250 miles. The total distance round will be some

560 miles, or thirty-seven hours steaming at 15 knots. The saving in fuel is another factor that will immediately appeal to the mind of every seaman.

Opinions upon canal.

Admiral of the Fleet Sir Edward Seymour, in answer to a question respecting his views, says:—

"Its chief values are: (1) Strategic—to move men-of-war quickly from side to side as required in war. (2) That Rosyth, our new naval establishment in Scotland, should be in close connection with the shipping works on the Clyde for repairs. Other reasons seem to me much inferior, but no doubt the canal would have its uses for commercial traffic."

Admiral W. H. Henderson writes: "On the surface my personal opinion is that, if made, it would be of strategic advantage, but I do not think that as a commercial undertaking it would pay; and I doubt if its strategic value is worth the great expenditure that it would involve."

Admiral Sir Cyprian Bridge is not of opinion that the canal would be useful from the strategic point of view, but he adds: "It is satisfactory to hear that the question of the proposed Mid-Scotland Canal is to be discussed."

An officer, serving at present in one of our active torpedo flotillas, has thus expressed himself: "The advantages all round are so tremendous that it would appear to me to be rather difficult to find anything to say against it—advantages, in view of the inevitable congestion at Rosyth, with a battle fleet or two and a swarm of us operating from there . . . . the scheme puts Rosyth in the position, metaphorically speaking, of the fortress with supports of food and supplies continually coming in, in place of one that is isolated . . . . access to the western shipping yards would be of enormous importance."

Lieutenant A. C. Dewar, writing in the *United Service Magazine*, says: "When the proposers of the canal urge such arguments as the following—Distance from Forth to Clyde North about 570 miles, distance from Forth to Clyde by canal 68 miles, distance saved 502 miles, they are arguing from nothing to nowhere. They assume that the Fleet is always going to start for the west coast from the upper reaches of the Forth, and that its destination is always to be the Clyde." He goes on to show the gain in time that would accrue to the Fleet in different circumstances, and sums up his conclusions thus: "These concrete examples are sufficient to show that the time saved by the canal route would rarely exceed twelve hours, unless the Fleet be within some 100 miles of the Forth, and desirous of proceeding to a spot some 100 miles from the Clyde."

Royal Commission on canals.

Turning now to the Report of the Royal Commission on Canals and Inland Navigation, it is stated, in "Recommendations as to Scottish Water-ways, Forth and Clyde Ship Canal," that:—

"Two alternative routes for a ship canal have been advocated. One route follows very nearly the line of the existing Forth and Clyde Barge Canal from Grangemouth on the Firth of Forth to Yoker on the Clyde, below the City of Glasgow. A ship canal taking this direct line would be about 30 miles in length, and would overcome a height of about 95 ft. The other suggested route would leave the Forth at a point 4½ miles below Alloa and 1¼ miles above Grangemouth, and proceed thence, past Larbert, Bannockburn, and Stirling for a distance of 35½ miles to Loch Lomond. The line of route would then be by Loch Lomond for a distance of 13½ miles to Tarbet, and thence by a cut of 1¾ miles to Loch Long, an arm of the sea. From this point on Loch Long to the Firth of Clyde is a distance of 15 miles. The total length of this route from the Forth to the Clyde would, therefore, be about 66 miles. The point at which it would join the Firth of Clyde would be about 20 miles lower down than the point of junction of the direct route at Yoker.

"Compared with the direct route, the distance by the Loch Lomond route is therefore 17 miles longer from Grangemouth to the Clyde opposite Greenock, and more than twice as long from the Forth to Glasgow. On the other hand, it is almost level, and ships would have to traverse two locks only, one at the entrance from the Forth and one at the entrance to Loch Long. On behalf of the direct route it is urged (1) that it would be shorter; (2) that it would pass through an industrial and coal mining district, and would, therefore, receive much local traffic. The district could also supply coal for bunkering ships on passage; (3) that it would be of more advantage to the commerce of Glasgow. On behalf of the Loch Lomond route it is urged that locks, and so time, would be saved, thus compensating for the greater distance, and that it would be better to bring the route into the Clyde at a lower point, in order to avoid congestion in the upper and narrower and more crowded part of the river. Greater safety would thereby be secured, especially in connection with the use of the canal for warships."

However excellent the reasons may be that commend themselves to the promoters of the canal by the direct route, they need not concern us here; as the Committee of Imperial Defence, to whom the project was submitted, refused to consider the Yoker route at all. Communications passed between the Royal Commission and the

Committee for Imperial Defence, the Commission stating that it "would welcome the considered opinion of the Committee of Imperial Defence"; adding that "the Commission have no idea of investigating for themselves the question of the degree of strategic importance to be attributed to this scheme. But, in reporting on it as a commercial canal, they need authoritative guidance on its strategic aspect from His Majesty's Government, or from the Committee of Imperial Defence. Information as to the views and policy of His Majesty's Government on the project of a ship canal suitable for use by ships of war appears to be necessary if the Commission are to make an effective Report; for there seems to be no reason to hope that such a canal would be constructed without State assistance."

Requirements of Committee of Imperial Defence.

The conclusions of the Committee of Imperial Defence forwarded to the Royal Commission are as follows: (1) A ship canal connecting the Forth and Clyde, and constructed to meet the requirements of the Admiralty, would unquestionably possess some strategical value. (The minimum dimensions required by the Admiralty are: Depth of canal 36 ft., width on floor of canal 148 ft. Locks, length 850 ft., width of entrance 110 ft., depth of canal lock 36 ft.) (2) This value alone would not be sufficient, however, to warrant any considerable expenditure from Government funds, or such a liability as a guarantee of interest on the total cost of construction as estimated. (3) Should there be a prospect of a canal being constructed for commercial purposes, it would then be worth while to offer some Government aid in order to secure the conditions laid down by the Admiralty as necessary for the passage of battleships. (4) The route through Loch Lomond and Loch Long is the only one which satisfies naval requirements.

There is one objection to the proposed canal which may here be stated—one which comes from the sailors. Some officers consider that there being only a certain amount of money available for naval purposes, it would be a mistake to allocate any of the funds required for purely naval purposes, such as ships, guns, and men, for the purpose of digging a canal. With this opinion the Association that is promoting the canal is in cordial agreement. What the Association point out is that in France such a scheme would be effected through the Minister of Public Works, who would demand a vote for the necessary amount. There being no Minister of State corresponding to this French official, the Association is compelled to work through the Admiralty, which body is naturally and rightly intensely jealous of any attempts on its purse. It will be remembered that some years ago it became necessary to spend an immense sum of money on harbour works at Gibraltar. The money was found and spent,

but the Navy was not one penny the worse because this most necessary national work was undertaken and carried to a satisfactory conclusion.

Cost.

The question of cost is naturally all-important. If we take first the cost of a mere commercial canal, 70 ft. width on the floor, and with a depth of 31 ft., we find that the engineers report that the cost of such a waterway would be £12,200,000. This size of canal it is considered would be amply sufficient to meet all commercial requirements. A canal 100 ft. in width of floor and of 36 ft. depth would, it is estimated, cost £20,012,500. A canal constructed according to Admiralty requirements would cost £24,400,000. Such a canal would take seven years to complete.

If a canal be constructed, Government aid will only be forthcoming on the assumption that the conditions laid down by the Admiralty are adhered to in their integrity, and this means almost exactly doubling the cost of construction. The promoters of the Mid-Scotland Ship Canal ask the Government to:—

"(1) Subscribe the additional capital that must be spent to bring the canal within the scope of the Admiralty requirements.

"(2) Or guarantee the interest on it, in which case the promoters would soon find the extra money.

"(3) Or what the promoters would prefer, guarantee the interest on the authorised capital at 3 or 3½ per cent.

"Any deficit, they consider, would be very small and at most for a year or two. The Government could have a lien over the earnings of the canal shares above the amount of working expenses, and, say, 3 per cent. to the shareholders, until it had got back any deficit it had to meet at the beginning."

Facilities.

In return for this guarantee and advance, arrangements would be made by which the Government would be repaid, and the nation would acquire the following rights:—

(1) Free passage to and fro for all Government ships and cargoes.

(2) Complete control in time of war.

(3) Sinking fund of all profit after 3 per cent. has been paid, until advance has been redeemed.

(4) After redemption, the Government still to retain a proportion of the profit for naval construction or such other purposes as they may approve.

(5) Then all profit over 3 per cent. to go to reduce the capital outlay, if so desired by the proprietors.

The commercial aspect.

If we turn to the commercial side of this venture, it will be interesting to recall what was said by Mr. J. B. Murray, a shipowner,

and a member of the Glasgow City Council, before the Royal Commission :—

"The institution of facilities where none existed before would, undoubtedly, give rise to trade developments and create traffic which does not at present exist, owing to the want of such facilities; and a great highway between the Atlantic and the North Sea would, if no undue restrictions were placed upon it, especially at first, be largely utilised.

"The tendency of the age is clearly in favour of what may be called 'through routes.' The yearly growing size of vessels, which is likely to continue, renders it increasingly difficult to collect full cargoes in the limited area of any district surrounding one port. The operations of the tramp steamer are becoming more restricted; and the tendency in shipping is towards the formation of regular lines of vessels of large size, for which cargo is obtained by calling at several ports.

"For instance, it is becoming difficult to fill up steamers of the tonnage now employed with the purely local traffic of the Clyde. This also applies to the local traffic in the case of steamers from the ports on the East coast and in the North of England.

"I believe that one effect of the construction of a canal would be to admit of the collecting in one ship of traffic to and from places on the North-East and North-West coasts. This also applies to vessels trading to and from the Continent, where, owing to the much larger Hinterland, the ports are favourably situated as regards the filling up of large steamers. I believe lines of through-going steamers would utilise the proposed water-way, especially if no undue Customs restrictions were placed upon vessels, whether British or foreign, loading or discharging in this country while passing to or from the Continent.

"While Continental lines would probably be attracted by the traffic they might pick up in Scotland, and possibly in the North of Ireland, British companies would have equal inducement to extend their lines, say, from Glasgow to Continental ports. Vessels from and to the Continent would find an additional inducement to utilise the canal in the way of bunker coal. The quantity of coal required for large steamers is very considerable. Excellent steam coal is obtainable on the canal at prices much lower than those on the Continent. Many steamers which at present visit the Bristol Channel for bunkers might, and doubtless would, prefer the facilities offered by the canal.

"In times of good trade, congestion and delays at the Bristol Channel coaling ports are often very great. Glasgow as a port is

regarded as disadvantageous by the managers of our ocean-going tramps because there is practically little or no outward freight for vessels of this class which, when discharged at Glasgow, have in the majority of cases to make a long shift to other loading ports, either in this country or on the Continent. This drawback, for which the importers of Glasgow have indirectly to pay, would, for the reasons I have just indicated, be largely obviated by a through-going canal."

Opinions of other ship-owners.

Although Mr. Murray was thus good enough to give his views, other shipowners are more reticent, and, in some cases, distinctly hostile to the idea of the canal. It is quite possible that the shipowner, if he be a local man—that is to say, one whose ship-owning business is in close proximity to the area to be served by the canal—may fear disturbance of his interests, may think that competition will arise in his own particular line. He does not want to meet with any disturbance in the ordered sequence of his trade; he does not desire to launch out in a perfectly new direction for gains that are speculative and problematical. The shipowner will not be the chief gainer by the canal, should it be constructed, but rather the manufacturer, the trader, and the general public.

Sir Alfred Jones.

The late Sir Alfred Jones, the well-known Liverpool shipowner, the head of the Elder Dempster Line, moved the following resolution in the Liverpool Chamber of Commerce, which was seconded by Mr. Robert Gladstone, Chairman of the Mersey Docks and Harbour Board, and carried unanimously: "That the Incorporated Chamber of Commerce strongly recommends for serious consideration the scheme for the proposed ship canal between the rivers Forth and Clyde, both on international grounds and as a means of creating and developing the water-carrying trade between the East and West ports of Great Britain." In moving the resolution, Sir Alfred said that, "if the canal could be made, it would be of great assistance to the commerce of this country, and he was of opinion that people could not be too progressive in this country in taking measuies not only to keep what we had, but to develop the country by canals and in other ways. Water carriage was very cheap and had many great possibilities before it."

Suez and Panama.

Before the construction of the Suez Canal men were filled with the direst misgivings as to its fate if it were constructed, and England, at any rate, would have nothing to do with the concern. That all these gloomy forebodings were wrong and came to nothing is now ancient history; as is also that brilliant sequel, the purchase of the Suez Canal shares by Lord Beaconsfield. All really great undertakings like the Suez Canal must be in the nature of a speculation; no man

can prophesy in what manner trade will be affected until the water-way is open for traffic. At the present moment the greatest enterprise that the world has ever seen in this connection, is on the point of realisation. It is needless to say that this is the Panama Canal. This also is a water-way in which the strategic advantages are obvious, the commercial potentialities, so far, latent. Yet the citizens of the United States did not hesitate to stand behind the necessary expenditure for this gigantic work, which may very conceivably run into one hundred millions sterling. Faith in the ultimate destiny of that canal has been sufficient to remove the mountain above the Culebra Cut, 520 ft. above the canal level, and to convert 163 square miles of country into the Gatun Lake, in order to tame the hitherto unbridled Chagres River.

There are a good many persons who hold optimistic views regarding the future of the Mid-Scotland Forth and Clyde Canal; so far they have received a decidedly qualified meed of approval from the Government. Still, the project is one on which those in authority do not frown, and it would appear that what is most necessary for the Association to discover is to what extent pecuniary help will be forthcoming from the State to assist in financing the enterprise. We have the example of Germany and the United States of America upon which to go, and what is possible for them is not beyond the competence of the United Kingdom.

E. HAMILTON CURREY.

CHAPTER X.

THE TURCO-ITALIAN WAR.

It is natural that those interested in naval affairs, or responsible for the conduct of them, should endeavour to derive from the events of the recent conflicts in the Mediterranean, fresh lessons which may modify what has been taught in the past, and perhaps indicate something new from the use of the later material of war, concerning the hostilities of the future. In the war between Turkey and the Balkan States, there were circumstances which limited the chances of obtaining much that is valuable in this way. The same was true of the conflict between Turkey and Italy. Greece had the potentialities of supremacy, and Italy was practically supreme, and no sea battles of importance took place in either war. But the operations, nevertheless, have something to tell of the influence of maritime strength. This chapter is not concerned with the events of the later war, which may be better described at a later date, but the narrative of the Italo-Turkish war, which was begun in last year's *Naval Annual*, is here completed as possessing much interest for naval students. Obviously, had that war continued, the Italian Navy must have been an important factor in the struggle which followed, and, indeed, in all the early forecasts of the probable progress of events, little account was taken of the Greek Navy, it being assumed that what the Greek Navy afterwards achieved would have been accomplished by the Italians. This notion was dispelled on October 18, 1912, when the formal terms of peace between Italy and Turkey were signed at Ouchy, on the Lake of Geneva, just nine days after the first shot of the Balkan War had been fired by Montenegro.

In the *Naval Annual* for 1912, the narrative of the earlier operations of the war between Turkey and Italy, chiefly compiled from newspaper reports, was brought down to the middle of March, 1912, and to make the continuation clear, a summary of the principal events connected with the Fleet during that period is appended.

Diary of Events, September, 1911, *to March*, 1912.

Sept. 28.—Italian Ultimatum sent to Turkey.

Sept. 29.—Italy declared war. Action off Preveza, Turkish torpedo-boat destroyed. Italian squadron left for Tripoli.

Sept. 30.—Action off Gomenitza, more Turkish torpedo craft destroyed. Italian ships appear off Tripoli. Wireless station at Derna destroyed.

Oct. 1.—Cable between Tripoli and Malta cut. Turkish steamer Sabah, with troops, captured.

Oct. 2.—Tripoli summoned to surrender.

Oct. 3.—First bombardment of forts at Tripoli. Italian Squadron arrived at Tobruk.

Oct. 4.—Second bombardment of Tripoli. Naval party landed. Tobruk occupied by naval brigade.

Oct. 5.—Tripoli occupied by naval brigade.

Oct. 10.—Italian transports arrived at Tripoli. Main expeditionary force left Augusta.

Oct. 12.—Army of Occupation reached Tripoli.

Oct. 13.—Naval brigade re-embarked.

Oct. 16.—Derna summoned and bombarded.

Oct. 17.—Derna occupied by Naval detachment. Homs bombarded.

Oct. 19.—Benghazi bombarded and occupied.

Oct. 21.—Homs occupied.

Nov., Dec., Jan.—Naval forces assisted in landing troops, patrolled the coast, established strict blockade, and, where necessary, furnished the Army ashore with detachments for attack or defence of position. Some small affairs took place in Red Sea, where (on Jan. 7th) Kunfudah was bombarded and several Turkish gunboats destroyed.

Feb. 24.—Action at Beirut, two Turkish vessels destroyed.

Work of the Navy.

At this date the more important ports and harbours on the coast of Tripoli and Cyrenaica were in the possession of the Italians. Their cruisers had appeared off the shores of Asia Minor, and small forces had secured the safety of communications and commerce in the Adriatic and Red Sea. Although on land the work of conquest in Libya was far from complete, and very much had yet to be accomplished, the supremacy of the Italian arms at sea had been asserted and was maintained. The Navy was largely employed in helping its military brethren, men and stores were freely lent by the Fleet to their comrades on shore, who, in all the operations which took place near the sea, had the co-operation of the guns of the ships. In addition, there fell to the seamen the work of the repression of the contraband trade in arms and munitions of war, a duty of great difficulty until every place of exit and entry had been stopped. At the same time, no precautions were omitted to assure that the further transport of Italian troops to Africa should be continued free from interruption.

At the outset of the war Italy had done everything possible to restrict the sphere of operations, but now, neither the success of her arms nor the attempts at mediation by neutral Powers having any

effect upon Turkey, who showed no inclination to yield, it became necessary to take further measures with a view, if possible, to force her to reconsider her position. It was reported that several courses of action were discussed in Rome with a view to putting further pressure on the Ottoman Government. A landing at Mitylene, a bombardment of Smyrna, an attack on the forts at the Dardanelles, or the occupation of some of the Ægean Islands—these and similar measures were said to have been under consideration. The important point is that so far the Fleet, while able to exercise undisputed command of the sea and to assist the Army by preventing the despatch of reinforcements to the invaded territory, had not been able to bring about a decisive result.

During March there were no naval operations of importance. To the general regret, Admiral Augusto Aubry, the Commander-in-Chief, died on the 4th on board his flagship, the Vittorio Emanuele III., at Taranto. He was succeeded by Vice-Admiral Luigi Faravelli, while Vice-Admiral Leone Viale took command of the Second Squadron. During this month the First Squadron was principally in Home waters and the Second Squadron at Tobruk, which place was being used as a naval base. During the same period Turkey not only showed no signs of yielding either to friendly mediation or to the success of the Italians in Africa, but continued active preparations for the defence of her ports in Europe and Asia. The forts at the entrance to the Dardanelles were strengthened with guns said to have been taken from those at the Bosphorus. From the Fleet anchored at Nagara torpedo craft patrolled the entrance to the Straits. At Smyrna, also, means were taken to restrict the entrance to the harbour, while at Salonika and other places regulations were made for the prevention of the unauthorised entry of vessels. On April 7th Vice-Admiral Faravelli was, at his own request, relieved of the superior command, his health having broken down, and he was succeeded by Vice-Admiral Leone Viale, while the command of the Second Squadron was conferred on Vice-Admiral Amero d'Aste Stella. The further operations may be dealt with under three heads:—The movements in the Eastern Mediterranean, including the occupation of the islands; the movements in support of further military operations on the coast of Libya, and the movements in the Red Sea.

Demonstration at the Dardanelles.

The prospects of peace seeming to be as remote as ever, a new plan of campaign was opened in April. The force selected to carry it out consisted of the two divisions of the First Squadron, the Second or Cruiser Division of the Second Squadron, the Torpedo Division under the Duke of the Abruzzi, with some auxiliary vessels, including

a cable ship. This force assembled from Taranto, Tobruk, and other places with great secrecy in the neighbourhood of the Island of Stampalia (Astropalia), one of the islands in the group known as the Southern Sporades, where there is an excellent harbour which had already been used by the Italian destroyers. The concentration was made on April 17th, and that night, or in the course of the following day, the cables belonging to the Eastern Telegraph Company, between the Island of Imbros and the mainland, and between Lemnos and Tenedos and Lemnos and Salonika, were cut by the cable ship. On the following morning (April 18th) at daybreak the Second Division of the First Squadron, under Rear-Admiral Presbitero, consisting of the Pisa, Amalfi, and San Marco, showed itself at the entrance to the Dardanelles, outside the range of the forts, and there manœuvred until about nine o'clock, when, as the Turkish ships made no sign of leaving their anchorage at Nagara, Admiral Viale brought the whole of his fleet into view. At this juncture a Turkish destroyer ran out of the Straits, apparently for the purpose of reconnoitring. Admiral Viale sent the cruisers Garibaldi, Varese, and Ferruccio in chase of her. Thereupon the Orkanieh Fort, on the Asiatic side of the Straits, opened fire, upon which the Italian admiral formed up his ships and began a bombardment of the forts on both sides of the entrance at a range variously estimated at from 10,000 to 13,000 yards. The firing on the part of the Italian ships appears to have been deliberate and well-aimed, and though only about 180 projectiles were fired, every one of these appears to have struck the forts. According to the official Turkish account, the barracks attached to Forts Orkanieh and Kum-Kaleh on the southern side, and those in Sid-el-Bahr on the European side, were slightly injured, and one soldier was killed. From other sources, however, it was reported that all the above-named forts, as well as Fort Ertogrul, on the European side, were repeatedly hit, a magazine at Kum-Kaleh was blown up, and the Turks lost some 500 killed and wounded. The bombardment lasted for about two hours from 11 A.M., and no damage was done to the ships by the Turkish coast artillery. Later in the afternoon the Fleet withdrew, and next morning anchored at Mudros Bay, in the island of Lemnos.

Operations at the Dardanelles.

On the same day (April 18th) the Emanuele Filiberto, of the First Division of the Second Squadron, destroyed the Turkish barracks at Vathy, in the island of Samos, and sunk a Turkish yacht, while the Benedetto Brin, of the same division, cut the telegraph cable between the island of Rhodes and Marmarice. Several wireless stations and cables communicating between the islands and the mainland were destroyed about the same time, and on the 23rd possession was taken

of the harbour in the island of Stampalia by the Pisa and Amalfi, of the Second Division of the First Squadron, and preparations made for turning it into a naval base. In consequence of these operations, the Turks closed the Dardanelles with mines.

The object of this demonstration on the part of the Italians appears to have been two-fold. In the first place, it was intended to manifest that the Italian Fleet was under no restraint with regard to its action in the Eastern Mediterranean; while, secondly, it was intended to indicate the superiority of the Italian naval forces by offering battle to the Turkish ships. It is clear that no landing was intended at the time, or at least an army corps would have been brought to the scene of action; nor does it appear that it was originally intended to bombard the forts. The challenge to the Turkish Fleet is obvious, for it could only have been with this purpose that a single division, consisting of three cruisers, was first put in evidence, and that not until some hours later was the whole strength of the force displayed. It is probable, nevertheless, that the Turkish ships had a good idea of what awaited them outside, and for this reason were unwilling to venture from their anchors at Nagara, a short distance above the promontory of Kilid Bahr, on the European side of the Straits. The Dardanelles were opened again as soon as the mines could be removed, the Turks recognising that to have kept the Straits closed would have exposed them to serious danger from other quarters. It cannot be said that the Italians reaped any material military advantage from this demonstration.

The occupation of Turkish islands.

The affair at the Dardanelles was but the prelude to further aggressive measures in the Ægean. Somewhere about the same date in April that the naval concentration took place, preparations began for the assembly of an expeditionary force at Tobruk, under the command of Lieutenant-General Ameglio. This force, which was about 8000 strong, including cavalry, mountain and machine guns, and a supply column, embarked in seven transports on May 1st, and the next evening, under the escort of the First Division of the Second Squadron, with some torpedo craft, left for Rhodes. Elaborate arrangements appear to have been made for the safe and secret transit of this force. The cables from Rhodes had been cut, cruisers patrolled the sea to the northward of the island, and flotillas of destroyers searched the gulfs of Mendelia, Kos, and Marmarice, and the neighbouring waters of Asia Minor. On May 3rd, the First Division of the First Squadron, with some cruisers and destroyers, left Stampalia and met the convoy the same night. Before morning, a complete blockade of the island had been established, and at noon the city was summoned to surrender. In the meantime, the disembarkation of the

expeditionary force had begun at 4 A.M. in the Bay of Kalitheas, to the north-east of the island, and some 10 miles south of the city. The landing was effected in boats and rafts towed by the steam pinnaces of the men-of-war, and by 10 A.M. all the troops were ashore, and the landing of the stores began. Everything, including artillery, horses, ammunition and stores, was put ashore in time for an advance on the city to be begun at two o'clock. Detachments from the Benedetto Brin and Emanuele Filiberto, which had covered the landing, accompanied the military force. After a skirmish with the Turkish garrison, the troops encamped for the night on the hills, and entered the city at 2 P.M. next day. In the meantime, a naval detachment had been landed under Rear-Admiral Corsi, the Chief of the Staff to Admiral Viale, and held the town until the military arrived. Some further operations were necessary before the Turkish garrison surrendered on May 17th, and in these the ships on the coast and detachments of seamen on shore took part. From May 12th to May 22nd the ships were engaged in capturing the neighbouring islands, and by the latter date the following had been occupied, in addition to Rhodes:—Kasos (Caxos), Karpathos (Scarpanto), Kharki, Piskopi (Tilos), Symi, Nisyros, Kos, Kalimnos, Leros, and Pamos (Patmos).* Rhodes is the most easterly island in the Ægean, the two next mentioned are between it and Crete, while the other islands lie to the north-west of Rhodes and belong to the Southern Sporades group. The Turkish officials were removed to Italy and small Italian garrisons placed in each of the islands.

The occupation of these islands, like the demonstration against the Dardanelles forts, could have no military value, although it was, of course, a further proof that Turkey was helpless at sea. It might also be said to give a further lesson of the limitations of maritime superiority, for despite her mastery afloat, Italy, in the presence of Turkey's formidable army on the mainland, was unable to push home her victories to a decisive point. The manner in which the movements of the expedition were kept secret until the last moment was a tribute to the efficient working of the Censor, and the operation of landing the troops rapidly on an open beach to the organisation and harmonious co-operation of the two services.

Torpedo craft at the Dardanelles.

The third episode of first importance in the operations in the Eastern Mediterranean took the shape of a daring raid or reconnaissance by torpedo craft at the Dardanelles. It is very likely that this exploit should be regarded as having been permitted by the Italian authorities by way of compliment or concession to the *amour*

* The first spellings given are those of the *Times* War Map of the Balkan Peninsula.

propre of the torpedo flotilla. Even if it was desirable to make certain that the Turkish Fleet was still at its anchorage at Nagara, and not, as had been reported, outside the Straits, it was hardly necessary to risk valuable lives and useful material for this purpose. The battleships and cruisers had taken part in bombardments of forts and in the capture of islands, while detachments from their crews had landed and fought most gallantly alongside their military brethren. While the labours of the torpedo craft had been of an equally dangerous and arduous nature, taking risks in perilous channels, watching night after night for smugglers of contraband and the like, and patrolling the sea in all weathers, these duties could not attract the same amount of public appreciation and approbation. A representative section of the force was now given the chance to exhibit more conspicuously the mettle of the whole body. It was an adventure such as brave and dauntless seamen must always ardently desire, and one in which those selected for the task proved the daring and the courage to be expected from the Italian Navy.

The contraband traffic.

At the time of the bombardment of the Dardanelles forts in April it was openly stated in Italy that no pledges would be given to limit the activity of the Fleet in the waters of the Ægean. Indeed, it was mainly by the pressure of her ships off the Turkish ports that Italy could hope to check the traffic in contraband and the carriage of arms to the coast of Africa. Thus, although for nearly a month after the occupation of the islands there was no renewal of offensive action on the Turkish littoral, Italian cruisers and destroyers were constantly reported to be patrolling the waters around the entrance to the Dardanelles, and torpedo craft had been seen at various places between Salonika and Smyrna. That the Turkish authorities expected something in the way of a land attack seems to have been clear, since they sent reinforcements to the neighbourhood of Gallipoli and to ports in Asia Minor. According to statements made at this time, there were some 30,000 troops in the vicinity of the forts on the European side of the Dardanelles, and as many as 80,000 in the neighbourhood of Smyrna, where a big review of the garrison was held early in July. Some colour was given to the rumours of a threatened descent by announcements in the Italian papers of another concentration of troops, and by the appearance of Italian destroyers to the eastward of Dede Agatch, between the island of Samothrace and the coast, and even in the Gulf of Xeros (Saros), where the boats were said to have been taking soundings off Yenikli harbour, not far from Bulair, and the narrowest part of the Gallipoli Peninsula. The only act of hostility, however, took place at Plaka, near Scala Nova, to the south of Smyrna. The

Turks appear to have been withdrawing troops from the island of Samos, when an Italian destroyer interfered, and two Italian seamen were killed. Then by way of reprisal the place was bombarded, and the shipping in the port destroyed. The next move took the Turks completely by surprise.

Torpedo-boat raid.

At midnight on July 18th a torpedo flotilla, under the command of Captain Enrico Millo, entered the Dardanelles. They got through the wide part of the entrance without being discovered until they were approaching Kephez Point, where one of the boats came into the glare of a searchlight, and batteries at once opened fire. The boats appear to have stood on for some short distance until the lights of the Fleet opened up to the eastward of Kilid Bahr, and then, having achieved their object, and finding the obstructions in the Channel too difficult to pass under the fire of the forts, they turned back and escaped with comparatively little damage. Upon the question of the actual distance they accomplished the accounts differ, the Italians in the boats believing that they penetrated almost as far as the narrowest part of the Channel between Chanak and Kilid Bahr, while some of the spectators on shore averred that the flotilla never got as high up as Kephez Point. As, however, it was also admitted that those on shore could see little, owing to the searchlights—and anyone who has witnessed a night attack by destroyers must be aware of the difficulties in this respect on the part of spectators—not too much reliance must be placed on these statements. It is probable that the official account is nearly correct, and although those in the boats might easily have been mistaken in supposing that they were fired upon by the Turkish ships as well as by the forts, it is quite likely that, surprised as they were, the Turkish gunners started firing, even if they saw nothing to aim at. Such things have been known to happen in better-regulated Fleets than that of the Turkish Empire.

A summary of a portion of Captain Millo's report, published in the *Times*, stated that the attack was made by five Italian torpedo-boats, the object of the raid being to torpedo the Turkish Fleet. Three of the boats were to attack the outermost warships, while the other two penetrated the Fleet for the purpose of destroying a vessel laden with mines. The attempt failed, all but one of the boats, the Centauro, being hit, though without material damage. A further account of the occurrence was published in the *Rivista Nautica* for November, 1912:—

On the night of the 18th-19th, a squadron of five torpedo-boats, the Spica, Perseo, Centauro, Climene, and Astore, entered the Dardanelles. They were led by Captain Enrico Millo, in the Spica. In spite of the vigilance of the searchlights at the entrance, the squadron was not discovered, and ran about a mile and a half up

the Straits, when the Astore, the last in the line, came under the beams of a light. A blank round gave the alarm, and was immediately repeated by the numerous look-out stations on both shores. A large number of searchlights illuminated the squadron, and the batteries opened fire. The boats increased their speed to 22 knots, hugged the European shore, and boldly continued their course towards the Kilid Bahr-Chanak Straits. On reaching the Straits, 12 miles from the mouth, the Spica, which was leading, struck one of the steel cables of the boom that had been fixed at that point. The torpedo-boats were then in view of the enemy's fleet, the ships of which were working their searchlights, and opened a violent fire with their anti-torpedo armament, to which was added the heavy fire of the numerous shore batteries. Having ascertained the position of the Turkish Squadron, convinced of the impossibility of torpedoing it, and certain of the complete destruction of the torpedo-boats if the attempt was made, Captain Millo gave orders to return; this was carried out under a perfect tempest of fire, and with marked boldness and *sang-froid* on the part of the commanders. The damage reported by the boats was insignificant. During the same night the ships of the First Squadron were to the south-west of Tenedos, ready for any eventuality if any Turkish unit happened to come out.*

Whatever the object of this raid may have been, it must be conceded that the exploit was boldly conceived and made with coolness and courage. Captain Enrico Millo, who was in supreme command, was Chief of the Staff to the Duke of the Abruzzi in the Vettor Pisani. He had filled the office of Director of Torpedo Operations, and is said to have organised much of the work of the torpedo flotillas. Of proved capacity and personal bravery, he doubtless felt that if such an adventure was to be attempted, no one had a better right to undertake the business than himself. His decision to withdraw when no further good could be accomplished without unnecessary loss proves his soundness of judgment and professional resource. The vessels chosen for the purpose were not of the latest and largest class in the Fleet, but five of a group of twenty-four built between 1905 and 1908. These boats have a displacement of about 200 tons, and carry, in addition to their torpedo armament, two or three 3-pdr. guns. They have a designed speed of 25 knots. The Spica was built at Elbing, the Astore by the Odero Company at Genoa, and the Climene, Centauro, and Perseo by the firm of Pattison, of Naples. It has been suggested that a sixth boat, the Calipso, a sister to the Climene, was in the flotilla, as a bucket with this name on it was picked up in the Straits after the affair, and it was inferred that she had been sunk and her presence purposely suppressed in the Italian report. Such an occurrence, however, could hardly have been kept secret for long, as the absence of the boat could not be concealed, and the friends of the crew would in time learn of their loss. Captain Millo was promoted to the rank of Rear-Admiral, and decorated with the Cross of the Military Order of Savoy for his distinguished gallantry. The Commanders and Chief Engineers were promoted, and received the

The torpedo-boats.

* The translation is taken from the *Journal of the Royal United Service Institution*, February, 1913.

medal for valour. Medals were also conferred upon the other officers and the men of the flotilla, and each of the five vessels received a gold medal to be kept on board as a lasting memento of the affair in which they took part.

Operations in Africa.

During the remaining months of the war the Navy continued to do splendid work with the military forces in Africa whenever the operations took place within range of the guns of the ships or landing parties were needed to second the work of the Army. The two most important cases of co-operation occurred at Sidi Said, near Zuara, in April, and at Bu Sceifa, to the eastward of Tripoli, in June.

About 20 miles to the west of Zuara is the gulf of Macabez, inside a peninsula of the same name. On the landward side of the gulf is the principal caravan route between Zuara and the Tunisian frontier. It was therefore of importance to occupy this place and the fort which protected it. A division of troops under General Garioni, about 12,000 strong, was embarked in eight transports under the escort of the Training Squadron, commanded by Vice-Admiral Borea Ricci. The ships present were the Sicilia, Sardegna, Re Umberto, Carlo Alberto, Marco Polo, Agordat, Coatit, and nine torpedo craft. On April 10th a feint at landing was made off Zuara by a detachment of the Fleet, and while the bombardment was in progress the remaining vessels convoyed the transports to Sidi Said, at the neck of the peninsula, where the seamen effected the disembarkation of the force. It was intended to have marched on the fort that afternoon, but bad weather caused a delay. Next day, however, a party of troops, with a detachment of seamen, occupied it. Considering the rough sea, the operations were conducted with great expedition, and so secretly had the whole business been carried out that not until the troops were ashore did it become known what was occurring. In some subsequent fighting divisions from the ships participated, assisted by the small craft in the gulf.

On June 16th the same squadron assisted at the capture of Bu Sceifa, an indentation in the land to the east of Cape Zuruk, and the so-called Port of Misurata, a trading centre some 60 miles east of Tripoli. An expedition, numbering about 10,000 troops of all arms, under General Camerara, escorted by the ships of the division, arrived off the place at daybreak, and, covered by the gunfire of the larger vessels, a disembarkation was carried out speedily and in good order. The landing was made in boats and rafts, as when the troops were put ashore at the Bay of Kalitheas. In the subsequent advance to Misurata, six miles inland, naval detachments assisted with their guns.

There were also engagements near the oasis of Zanzur, 12 miles from Tripoli, in June and in September, when the ships operated off the coast and compelled the Turkish left wing to abandon its position. Again, in August, the Navy assisted at the capture of Zuara, the troops disembarking under the protection of the ships, and in this operation with the squadron were the Etna and two smaller vessels, schoolships from the Naval Academy at Leghorn, with the cadets on board.

In all the operations along the Tripolitaine coast, until Zuara, the last place of any importance, had fallen, the Navy rendered valuable assistance. In all the disembarkations, the seamen, not only as working parties putting the troops and stores on the beach, but by means of detachments thrown ashore in advance of the military, and by the guns of the ships covering the landing, afforded help. This work was carried out under all conditions of weather, and often in only partly surveyed waters, where navigation was difficult and dangerous. The seamen became so expert at the job that the disembarkations were carried out with the utmost ease and rapidity. On shore, the naval brigades were conspicuous for energy, vigour, and courage, while afloat, either in squadrons or by single ships, to the same service fell the arduous duty of patrolling the coast and suppressing smuggling. For organising or for fighting they were equally ready, and from all the authorities they received the highest praise.

The operations east of Suez after March, 1912, were of no great importance. The squadron consisted of five protected and three other cruisers, with two auxiliary vessels. In April it was announced that the blockade which had been declared in January would be extended to include Loheia, and as the island of Camaran had been excluded because it was the quarantine station for the pilgrims to Mecca, it was now placed within the sphere of observation, since the Turks had used it as a base of supplies for Hodeida. At the same time the cable between Camaran Island and the mainland was cut. Towards the end of June the Farsan Islands were occupied by parties from the Italian ships, and in July the Piemonte and Aretusa shelled the military buildings and the camp at Hodeida, blowing up the magazines in the forts. **In the Red Sea.**

Just before the close of the war, the Second Squadron, composed of the Regina Margherita, St. Bon, Filiberto, Garibaldi, Ferruccio, and smaller vessels, made a visitation to the coasts of Asia Minor, calling at the ports of Jaffa, Haifa, Beyrout, Alexandretta, Latakia, Messina, Adalia, and other places. The First Squadron returned to Italy, but when in October there appeared to be a hitch in the peace

negotiations, the ships of this squadron were got ready for further action in the Ægean. When, however, it was known that peace had been definitely established, the order for departure was cancelled. A complete account of the organisation of the naval bases at Tobruk and Stampalia would be most interesting and valuable. There is, indeed, in the naval campaign much that will repay attention when detailed accounts are available.

The King's review.

To celebrate the success with which it carried out its duty during the war, King Victor Emmanuel held a review of the Fleet in the Bay of Naples, on November 11th, the date of His Majesty's forty-third birthday. Twelve battleships, four destroyers, and seventeen torpedo-boats took part in the review, and the King and Queen, in the royal yacht, escorted by the five torpedo-boats which took part in the raid on the Dardanelles, steamed through the lines, and then anchored while the ships weighed and steamed out of the bay. Admiral Viale was in command of the Fleet.

One other circumstance must be mentioned. In the account of the earlier operations given in the *Naval Annual* for 1912, it was stated on page 163 that in an affair near Tobruk in October, 1911, the Italians lost a lieutenant and a doctor. It is with much pleasure that this statement is now corrected, the lieutenant in question having written to assure us that he is still alive and his friend the doctor has since recovered from his wounds. We offer our hearty congratulations to Count Manfredi Gravina and to his comrade, Dr. Allegri, and trust that they will forgive the error into which we were led by a newspaper account of the engagement.

CHAS. N. ROBINSON.

CHAPTER XI.

The Dominions and Imperial Defence.

The problem of Imperial Federation.

For many years, in these pages and elsewhere, I have pointed out that the burden of defending the Empire was becoming too heavy for the Mother Country to bear alone, and that it was the duty of the outlying Dominions to come to her aid. This duty they have already begun to recognise, and the fact that they have done so has been a great strength to the Mother Country in recent years. The assistance they have so far given has been intended to meet the exigencies of the moment. No definite principles as to the part which the oversea Dominions should play in the defence of the Empire have yet been laid down or, at any rate, generally accepted. If the resources of the whole Empire are to be drawn upon for the common defence—and they must be if the Empire is to stand—it is certain that every Dominion which bears its share of Imperial burdens is entitled to a voice in the control of Imperial expenditure and Imperial policy. The attitude taken up by the present Canadian Government, under the leadership of Mr. Borden, on the question of Naval Defence is bringing us very rapidly face to face with the problem of Imperial Federation. It will not be out of place to review in the *Naval Annual* the progress of the movement in the direction of Imperial unity, and to point out the difficulties which have to be overcome before the object in view is realised.

Growth of foreign navies.

When the Editor commenced his duties twenty years ago, and up to the end of the last century, there was no Navy which could be seriously compared with our own but that of France, and our naval policy was largely, if not mainly, governed by French action. Our Navy was supreme in nearly every sea, and the British Flag was shown and respected in all quarters of the globe. During the present century a completely new situation has arisen. Powerful navies have sprung into existence in the United States, in Japan, and in Germany. Every first-class European Power has largely increased its expenditure on its navy. This is true of France and Russia, of Austria and Italy, as well as of Germany. Spain has seriously commenced the creation of a navy, and the South American Republics, Brazil, Argentina, and Chile, have acquired, or are building, ships as powerful as any in the world. The United States is the only first-class Power which has reduced her naval expenditure in recent years.

It is the growth of the German Navy above all which has affected

the situation. In the last ten years German naval expenditure has more than doubled, and her expenditure on new construction has nearly trebled. Though the British Navy Estimates for the year 1912-13 amounted to the vast sum of £44,000,000, or almost exactly double those of Germany, the sum Germany is able to devote to new construction is not far short of our expenditure for this purpose. During the current year Germany is spending in round figures £12,000,000 to our £14,000,000. The explanation of this fact is the greater cost of the *personnel* and the larger number of ships maintained in commission in the British Navy. The result in the increase of German naval expenditure is that Germany now has a formidable naval force in immediate readiness for service in the waters of Northern Europe, and to meet the new situation large numbers of ships have been withdrawn from foreign stations, and practically the whole of our fighting strength has been concentrated in Home waters.

The consequences. The China Battle Squadron has disappeared. The Japanese Navy is undisputed mistress of the Eastern Seas. In the Mediterranean ten years ago we maintained a powerful fleet. The Mediterranean Battle Squadron has ceased to exist. For a time last year the Mediterranean, our great highway to Egypt and the East, was without a British battleship. In the West Indies, in the waters of South America, and other regions of the world where we have vast commercial interests, the British Flag is hardly ever shown, and then only by a small cruiser.

Twenty years ago the cost to the British taxpayer of Imperial Defence was £35,500,000, of which in round figures £20,500,000 were spent on the Army and £15,000,000 on the Navy. Though our expenditure on Imperial Defence has doubled in the last twenty years, and though the proportions of our naval and military expenditure have been normal, we are not able to give that protection to our interests in distant seas which those interests demand.

Imperial Conference, 1909. The realisation of this fact in New Zealand and Australia led to the offer of battleships to the British Navy in the spring of 1909. Since 1887 an annual contribution to the cost of the maintenance of the Australian Squadron of the British Navy has been made by the Governments of Australia and New Zealand, but in 1909, for the first time, it was recognised that something more substantial was necessary. The offers were accepted, and the Conference of 1909 was summoned to discuss the whole question of the Naval and Military defence of the Empire. The Conference accepted the principle, which I have always maintained, that the military forces of the self-governing Dominions must remain

under the complete control of the respective Governments, but it was arranged that the organisation, the staff, the arms, and equipment should be, as far as possible, standardised so that, to quote the Prime Minister's words, "Should the Dominions desire to assist in the defence of the Empire in a real emergency, their forces could rapidly be combined into one homogeneous Imperial Army." As the result of the measures decided upon at the Conference, and of others taken since, considerable progress has been made in the organisation of effective military forces in the Oversea Dominions, notably in Australia and New Zealand. As to Naval defence, no definite principle was or could be laid down by the Conference. New Zealand preferred to adhere to her policy of contribution; South Africa was not in a position to do more than continue her contribution. Australia and Canada preferred to lay the foundations of fleets of their own. It was decided to establish a Pacific Fleet of three units in the East Indies, in Australia, and China, each consisting of a battle-cruiser and three second-class cruisers, besides destroyers and submarines. The battle-cruiser (substituted for battleship) offered by Australia was to become the flagship of the Australian unit, that offered by New Zealand of the China unit. The then Government of Canada proposed to construct in Canada a few second-class cruisers and destroyers for Canadian defence.

Imperial Conference, 1911.

At the Imperial Conference of 1911 a Memorandum between the Admiralty and representatives of Canada and Australia was submitted defining the status of the Canadian and Australian Navies, as follows: "The Naval services and forces of the Dominions of Canada and Australia will be exclusively under the control of their respective Governments." These words signified that it rested with the respective Governments to decide whether their Naval forces should be utilised in the common defence in case of war, thus recognising the position that Sir Wilfrid Laurier had taken up. This position is by no means satisfactory. In the writer's opinion, the Dominions must either stand in the Empire or outside it. No Dominion can claim the help of the British Navy in officers and men in building up her Navy, and to have the whole weight of the British Empire behind her when her interests are at stake, and be free to stand aloof when trouble arises over some question with which she is not immediately concerned. The most important decision of the Conference was that one or more representatives appointed by the Governments of the Dominions should be invited to attend meetings of the Imperial Defence Committee when questions affecting the Oversea Dominions were under discussion.

Committee of Imperial Defence.

In the autumn of 1911 a change took place in the Government of Canada, and last summer Mr. Borden and three of his colleagues (who hold very different views from their predecessors) visited England to consult with His Majesty's Government as to the part Canada should play in the defence of the Empire. The Government made it absolutely clear to Mr. Borden that the Committee of Imperial Defence is a purely advisory body and cannot under any circumstances become a body deciding on policy which is and must remain the prerogative of the Cabinet, but they gave assurances that any Dominion Minister resident in London would at all times have free access to the Prime Minister, the Foreign Secretary, or the Colonial Secretary for information on all questions of Imperial policy.* Mr. Harcourt, in his speech in the House of Commons, which is quoted in the despatch, put the position admirably. "The door of fellowship and friendship is always open to the Dominion Ministers, and we require no formalities of an Imperial Conference for the continuity of Imperial confidence." Mr. Borden cordially accepted representation on the Committee of Imperial Defence, as a satisfactory though admittedly temporary solution of the question of giving the Dominions some voice and influence in the Councils of the Empire, in the great speech he delivered in the Canadian Parliament in December, and in response to the Admiralty Memorandum he proposed that Canada should at once present three vessels of the most powerful type to the British Navy, which in the event of Canada eventually deciding to have a Navy of her own could, if Canada desired, become the nucleus of that Navy. Mr. Borden, while expressing in unmistakable terms his own opinion in favour of one Imperial Navy, has left for future discussion the form which Canada's assistance to Naval defence of the Empire should take. On this review of what has taken place two observations may be made. Canada has been rather slow in recognising her responsibilities in Imperial Defence, but the present Government of the Dominion has now recognised them in a manner worthy of the Canadian people. In the second place, the difficult question of giving the Oversea Dominions some voice in the Councils of the Empire in this period of transition has been admirably handled by the Colonial Secretary, Mr. Harcourt, and His Majesty's Government. Representation on the Committee of Imperial Defence was the proper way of dealing with the matter.

Requirements of Imperial Defence.

Having reviewed the recent history of the problem under consideration, we must now face the facts of the situation and endeavour

* *Cf.* Mr. Harcourt's despatch to the Governors of the other self-governing Dominions, published as a Parliamentry Paper in January, 1913.

to make some suggestions as to its solution. We have seen that we have a Navy concentrated in Home waters and powerful enough at the decisive point, but which does not give adequate protection to our outlying Dominions and Dependencies and to our commerce in distant seas. We are dependent on the good-will of France for the passage through the Mediterranean. Australia, with her enormous sparsely-peopled territory, the Pacific coast of Canada, India, and our other Eastern possessions would be exposed to attack by Japan if good relations did not exist between the two Empires. China has a population equal to that of the whole British Empire. Whatever may be said of the governing classes, the mass of the population are of a sturdy and virile race. The possibilities of China developing into a world Power, and the desire of both Japan and China for expansion, must not be forgotten when considering the facts of the situation. The Empire needs a Navy sufficiently powerful to defend its possessions and its commerce in all quarters of the world. It needs that Navy for the purpose of defence and not for aggression. Within the area of the Empire the British race has sufficient possibilities of expansion to satisfy the most ambitious Imperialist. So long as we possess an all-powerful Navy the Empire is invulnerable, except in Canada and in India, which have long land frontiers. With our small Army other Powers are invulnerable by us, except in their commerce and oversea possessions. We need a foreign service Army for the defence of India, and for attack on the coaling stations and colonies of any possible enemy. Every Dominion should possess its expeditionary force under the control of their respective Governments, but capable of serving the Empire whenever called upon to do so. The military side of the question of Imperial defence is a comparatively simple one. The general principles have been agreed upon, and it only remains for the people of the Mother Country to recognise, as the peoples of our democratic Dominions have done, that the first duty of a citizen is to defend his own country.

Naval defence.

The Naval side of the question is by no means so simple. In what form is the help of the Dominions to be given—on the Australian plan or on the plan favoured by Mr. Borden? The establishment of independent navies in the several Dominions is open to the grave objections which have often been stated. On the other hand, it is possibly the best, in some cases the only, way of inducing at the present stage the people of our Oversea Dominions to co-operate in naval defence. This, at any rate, is certain, that we must accept the help of the Dominions in whatever form they may please to offer it.

Before Canada, Australia, or South Africa finally adopts the

Cost of independent navies.

policy of independent navies, built and manned in the respective Dominions, let them consider all that such a policy entails, and count the cost. It is one thing to build warships in this country, with its highly-developed resources, not only for building the hulls and engines, but for supplying guns, armour, and the enormous mass of auxiliary machinery which are required in a modern warship. The want of such establishments in Italy for providing this subsidiary machinery has been one of the chief causes of the delay in the construction of Italian warships. From the broadest Imperial point of view it is undoubtedly desirable that there should be at Halifax and Esquimault, at Sydney, at Auckland, and at Capetown, dockyards capable of dealing with the largest repairs. It might be an advantage that shipyards capable of building warships of all classes should be established in Canada and Australia, but the cost would be enormous, and the outcry raised in Canada against Mr. Churchill for pointing out the cost appears singularly out of place. In any case, the object in view can only be gradually attained on the lines adopted by Australia and proposed by Mr. Borden for Canada. Shipyards should be established capable of building destroyers and light cruisers, before the construction of battleships and battle-cruisers is attempted. The development of the resources for the construction of such ships; the building up of a body of skilled workmen will take many years. Again, it is one thing to build warships; it is quite another to officer and man them. There is at present little indication that either Australia or Canada will be able to do this for several years to come, though progress in the desired direction has been much greater in Australia than in Canada. In Australia the number of Australian-born men recruited for the Navy is approaching 1400, besides some 350 men of the existing Australian naval forces. The number recruited in Canada for the Niobe and Rainbow does not exceed 300, and of these some have ceased to serve. It must not be forgotten that it takes nine years to train an officer and five years to train a seaman for any of the skilled ratings.

On these considerations and a general review of the whole question the conclusion is inevitable that, whatever may be done to satisfy the conditions at the moment, the naval defence of the Empire can be more efficiently provided for by one Imperial Navy under single control than by a number of Independent Navies under the control of the various Dominions. If we are to have one Imperial Navy, to the maintenance of which the resources of the whole Empire are contribute, we are compelled to face the problem of Imperial Federation.

The maintenance of the unity of the Empire depends upon the recognition of two principles: **Principles of Imperial unity.**

1. The right of every part of the Empire which is capable of self-government to manage its own internal affairs in its own way.

2. The right of every part of the Empire which bears its fair share of Imperial burdens to a constitutional voice in the control of Imperial expenditure and the direction of Imperial policy.

The first principle is recognised as far as the outlying Dominions of the Empire are concerned. It implies that the Imperial Government, which is at present responsible only to the people of the United Kingdom, has no right to interfere in matters which exclusively concern the people of Canada or of any other of the outlying Dominions. It also implies that the Oversea Dominions have no right to interfere in questions which concern the people of the United Kingdom.

The recognition of the second principle involves two things—viz., the raising of an Imperial revenue, and the constitutional representation of those Dominions which contribute their fair proportion of the Imperial revenue in the councils of the Empire.

Imperial revenue. As to the raising of the Imperial revenue, my remarks will be brief. Such a revenue may be raised by each part of the Empire paying its quota into a common fund. On what principle the quota is to be based for the self-governing Dominions, on what principle that for India and the dependencies, will be a difficult problem to solve. The simplest solution is that suggested by the late Mr. Hofmeyer at the Colonial Conference of 1887. Mr. Hofmeyer proposed that every part of the Empire, while pursuing its present fiscal arrangements or modifying them as it pleased, should impose a differential duty on non-Imperial goods of 5 per cent., or whatever amount might be required. The advantage of this plan is that the Mother Country could adhere to her present Free Trade policy and the Oversea Dominions might remain Protectionist as regards goods coming from within the Empire. All would impose the duty on non-Imperial goods.

Constitutional structure of Empire. Before we can consider the representation of the Dominions in the councils of the Empire, it is necessary clearly to understand how the Empire is at present governed and what should be its constitutional structure. This will best be understood from the accompanying diagram, which is based on the conception that the constitutional structure of the Empire must rest on four pillars or four federations (using the word in a loose sense) in the self-governing Dominions. Forty years ago the first of these pillars was completed, viz., that in Canada; fourteen years ago the second pillar, the

Commonwealth Government of Australia, was set up; three years ago the third pillar, the Union Government of South Africa, was established. As far as the outlying portions of the Empire are

IMPERIAL PARLIAMENT.

- *United Kingdom Parliament.*
  - *England*
  - *Scotland*
  - *Ireland*
  - *Wales.*
- Dominion Parliament of Canada.
  - Quebec
  - Ontario
  - Nova Scotia.
  - British Columbia
  - etc.
- Commonwealth Parliament of Australia.
  - New South Wales.
  - Victoria
  - Queensland.
  - South Australia
  - Tasmania
  - West Australia
- Union Parliament of South Africa.
  - Cape Colony
  - Natal.
  - Transvaal
  - etc.
- Newfoundland
- New Zealand
- India.
- West Indies
- Crown Colonies

concerned, the pillars of the Imperial structure are built—though each has been built on very different lines. It is only the Mother Country that lags behind, and it now rests with us to set our house in order before any further advance towards Imperial unity can be made.

Imperial Parliament overloaded.

The main point which is so difficult for Englishmen to grasp is this, that while every Canadian, every Australian, and every South African is living under three Parliaments or Councils, each dealing with a distinct class of business, we in the old country are attempting to deal in a single Legislature with *three* distinct classes of business:—

1. The internal affairs of England, Scotland, and Ireland, which in Canada would be dealt with by the Provincial Parliaments of Ontario and Quebec; in Australia by the Colonial Parliaments of Victoria and New South Wales; in South Africa by the Provincial Councils of the Cape Colony or the Transvaal.

2. Questions affecting the United Kingdom as a whole, which would be dealt with in Canada by the Dominion Parliament, in Australia by the Commonwealth Parliament, and in South Africa by the Union Parliament.

3. The government of the greatest Empire the world has ever seen, including within its borders nearly a quarter of the human race.

Consequent breakdown.

To carry on the government of the Empire and of these islands as we are attempting to do is no longer possible. That the Mother of Parliaments has broken down is now admitted on all hands.

Liberal statesmen, from Mr. Gladstone onwards, have pointed out that the Parliament was overweighted. On December 30th last the leader of the Conservative Party stated: "Under the conditions under which we are working the House of Commons has ceased to be a legislative assembly in any sense of the term"; and he concluded his speech by asserting that if the Parliamentary conditions as we now see them are to become permanent our institutions cannot be preserved, and, what is more, they will not be worth preserving. A remedy for the present intolerable situation must be found; devolution in some shape or other is necessary from the point of view of the Mother Country. This is a side of the question into which we need not enter in these pages.

It is, however, necessary to point out the danger to Imperial interests and to the maintenance of Imperial unity from Imperial questions and British domestic questions being dealt with by the same authority and submitted to the electors in the same confused issue. At one election, as in the year 1900, a Government may be placed in power on a great Imperial issue and proceed to deal with domestic questions in a way not approved by the majority of the electorate At another election, some question, such as licensing or education, of no importance to the Empire at large, may be to the front, and a Government placed in power which the majority of the people would not trust with the administration of Imperial interests. The reason why the democracies in Australia and our other Oversea Dominions are in the main Imperialist is because their domestic interests are not subordinated to Imperial issues as those of the British democracy were in an election such as that of 1900. The great Oversea Dominions will not long permit the interests of the whole Empire to remain at the mercy of British party politics. For this reason, as well as for those already mentioned, better provision for the government of the Empire must be made.

In days gone by suggestions used to be made for giving the Oversea Dominions a voice in Imperial Councils by adding their representatives to the Privy Council, the House of Lords, or even, on the French plan, to the House of Commons; but it is now generally admitted that the authority by which this Empire is to be governed in the future cannot be evolved out of existing institutions. It must be a Parliament or Council created *ad hoc* which will contain representatives of India, the West Indies, of the Malay States, and of our Dependencies in Africa, etc., as well as of the great Dominions, viz., of all who bear their share of Imperial burdens.

One Imperial Navy, maintained by the resources of the whole Empire, an Imperial Parliament or Council, in which the Oversea

Dominions are constitutionally represented, and which will control Imperial expenditure and Imperial policy, are the aims for which we must strive, but they cannot be realised at once. It must be borne in mind that the Empire is in a transition stage. The Colonial Conference has only recently become the Imperial Conference. The Colonies have only recently become Dominions, and the Dominions are only just beginning to feel that they must play a serious part in Imperial defence if the Empire is to be adequately defended at all points. During the transition stage it may be necessary to accept the help of the Dominions in the form of units in close touch with the Imperial Navy, though controlled by the Dominion Governments in time of peace. There is every reason to believe that the Dominion units will be freely placed under the control of the British Admiralty in time of war. As Mr. Watt, the Premier of Victoria, said at a recent luncheon under the auspices of the Colonial Institute: "While it is important to know whether the navies which had been built by Canada or Australia should be controlled by the contributing units or be under the direct control of the Admiralty, it was still more important to know that those ships were to be built, and that when their guns spoke they would speak in defence of the interests of British unity." Though Imperial Federation is not yet an accomplished fact, we have progressed, and are progressing steadily and without a set-back in the desired direction. The prospects of the British Empire remaining united and being able to hold its own against all comers are infinitely stronger than they were twenty-five years ago.

HYTHE.

PART II.

LIST OF BRITISH AND FOREIGN SHIPS.
BRITISH AND FOREIGN AIRSHIPS.

PART II.

LIST OF BRITISH AND FOREIGN SHIPS.

THE following abbreviations are used throughout the Alphabetical List:—

a.c. Armoured cruiser.
a.g.b. Armoured gunboat.
b. Battleship.
b.cr. Battle-cruiser.
l.cr. Light cruiser.
c.d.s. Coast-defence ship.
comp. (in armour column). Compound or steel-faced armour.
cr. Cruiser.
d.v. Despatch vessel.
g.b. Gunboat.
g.v. Gun-vessel.
H.S. Harveyised or similar hard-faced steel.
K.S. Krupp steel.
shd. Sheathed.
P. Protected.
t. Turret-ship (in class column).
t. Speed and I.H.P. at trials (in speed and I.H.P. columns).
to.cr. Torpedo-cruiser.
to.g.b. Torpedo-gunboat.

l. Light guns under 15 cwt., including boats' guns.
M. Machine guns.
sub. Submerged torpedo tube.
A. Armstrong guns.
K. Krupp guns.

The following abbreviations are used to distinguish the various types of boilers:—

W.T. Water-tube boilers, where the type is not known.
B. Belleville.
Bl. Blechynden.
B. & W. Babcock and Wilcox.
D'A. D'Allest.
D. Dürr.
E. Earle.
Ex. Express.
Du T. Du Temple.
L. Laird.
L.N. Laird-Normand.
M. Mumford.
My. Myabara.
Nic. Niclausse.
Nor. Normand.
N.S. Normand-Sigaudy.
R. Reed.
T. Thornycroft.
T.S. Thornycroft-Schulz.
W.F. White-Forster.
Y^1. Yarrow small tube.
Y^2. Yarrow large tube.
V.E. Vickers Express.
cyl. Cylindrical.

The following abbreviations distinguish types of turbines:—

P.T. Parsons.
C.T. Curtis.

GREAT BRITAIN.—Armoured Ships.

Class	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Makers of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	Aboukir shd.	12,000	440	69½	26¼	21,375 B.	Govan .	Fairfield .	1900	1902	751,118	6–2 K.S.	3–1½	..	5 H.N.	6 K.S.	5	2 *9·2-in.*, 12 *6-in.*, 12 *12-pr.*, 5 *3-pr.*, 8 M., 2 l.	2	21·6 *t*	800 / 1600	755
a.c.	Achilles . .	13,550	480	73½	27	23,275 Y² & cyl.	Elswick .	Hawthorn	1905	1907	1,191,103*	6–4–3 K.S.	¾–1	6	6	6	6	6 *9·2-in.*, 4 *7·5-in.*, 29 *3-pr.*, 2 M.	3	23·27 *t*	1000	704
b.	Africa . .	16,350	425	78	26¾	18,698 B. & W. & cyl.	Chatham	J. Brown .	1905	1906	1,461,429*	9 H.S.	2–1	8–7	12 H.S.	12–6 H.S.	7 K.S.	4 *12-in.*, 4 *9·2-in.*, 10 6-in., 12 *12-pr.*, 17 *3-pr.*, & M.	4	18·95 *t*	950 / 2150	825
b.	Agamemnon .	16,500	410	79½	27	17,285 Y²	Dalmuir .	Hawthorn Leslie	1906	1908	1,651,289*	12–6 K.C.	2	8	8	12	7	4 *12-in.*, 10 *9·2-in.*, 24 *12-pr.*, & 5 M.	5	18·75 *t*	900 / 2500	865
b.	Ajax . .	23,000	555	89	27½	27,000 B. & W.	Greenock	Scott . P.T.	1912	..	1,916,330 *	12	..	9	..	10	..	10 *13·5-in.*, 16 *4*-in. . .	3	21·5	900	900
b.	Audacious					27,000 Y²	Birkenh'd	Cammell Laird P.T.	1912	..	1,937,435 *											
b.	Albemarle .	14,000	405	75½	26½	18,296 B.	Chatham	Thames Ironworks	1901	1903	1,009,835	7–3 K.S.	2–1	7	7 K.S.	11 K.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 4 *3-pr.*, & M.	4	18·6 *t*	900 / 2000	750
b.	Albion . .	12,950	390	74	26	13,885 B.	Blackwall	Maudslay .	1898	1902	858,745	6–2 H.N.	3–1	6	12–8 H.N.	12–6 H.N.	5 H.N.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 8 *3-pr.*, & M.	4	17·8 *t*	800 / 2300	700
a.c.	Antrim .	10,850	450	68½	25	21,604 Y. & cyl.	Clydeb'nk	J. Brown	1903	1905	906,335*	6–2 H.N.	2–¾	..	4½ H.N.	6 H.N.	6 H.N.	4 *7·5-in.*, 6 *6-in.*, 25 *3-pr.*, 2 M.	2	23·02 *t*	800 / 1950	655
a.c.	Argyll .					21,190 B. & W. & cyl.	Greenock	Greenock Foundry	1904	1906	906,308*									22·38 *t*		

a.c.	**Bacchante** shd.	12,000	440	69½	26¼	21,520 B.	Clydeb'nk	J. Brown	1901	1902	787,230	6–2 K.S.	3–1½	..	5 H.N.	6 K.S.	5	2 *9·2-in.*, 12 *6-in.*, 12 *12-pr.*, 5 *3-pr.*, 8 M., 2 l.	2	21·75 *t*	800 1600	755
b.	**Barham**‡ .	. 27,500	600	..	..	60,000	Clydeb'nk	J. Brown P.T.	Bldg.	..	..	..	..	..	..	..	..	8 *15-in.*	..	25	..	..
b.	**Bellerophon** .	18,600	490	82	27	23,000 B. & W.	Portsm'th	Fairfield . P.T.	1907	1909	1,765,342*	11–6–4 K.C.	..	8	..	11 K.C.	..	10 *12-in*, 16 *4-in.*, 5 M. .	3	21·80 *t*	900	780
b.	**Benbow**‡ .	. 25,000	580	90	28	29,000	Dalmuir .	Beardmore P.T.	Bldg.	..	..	12	..	9–8	..	..	..	10 *13·5-in.*, 12 *6-in.*, 6 *3-pr.*	4	21	900	..
a.c.	**Berwick** .	. 9800	440	66	24½	22,681 Nic.	W. Beard-more & Co.	Humphrys	1902	1903	750,984	4–2 H.S.	2¾	..	5 N.S.	5–4 N.S.	4 N.S.	14 *6-in.*, 8 *12-pr.*, 5 *3-pr.*, 9 M.	2	23·61 *t*	800 1600	537
a.c.	**Black Prince** .	13,550	480	73½	27	23,939 B. & W. & cyl.	Blackwall	Thames Ironworks	1904	1906	1,193,414*	6–4–3 K.S.	¾–1	6	6	6	6	6 *9·2-in.*, 10 *6-in.*, 25 *3-pr.*, 2 M.	3	23·65 *t*	1000 2000	704
b.	**Britannia** .	. 16,350	425	78	26¾	18,725 B&W & cyl	Portsm'th	Humphrys	1904	1906	1,450,757*	9 H.S.	2–1	8–7	12 H.S.	12–6 H.S.	7 K.S.	4 *12-in.*, 4 *9·2-in.*, 10 *6-in.*, 12 *12-pr.*, 17 *3-pr.*, M.	4	18·74 *t*	950 2150	825
b.	**Bulwark** .	. 15,000	400	75	26¾	15,000 B.	Devonp't	Hawthorn	1899	1902	997,846	9 H.S.	3–2	3 K.S.	12 H.S.	12–5 H.S.	6–2 K.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 4 *3-pr.*, & M.	4	18·15 *t*	900 2000	781
b.	**Cæsar** .	. 14,900	390	75	27½	12,000	Portsm'th	Maudslay .	1896	1897	885,212	9 H.S.	4–2½	9	14–9 H.S.	14–6 H.S.	6 H.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 6 *3-pr.*, 2 M., 2 l.	5	18·7 *t*	900 2000	757
b.	**Canopus**	. 12,950	390	74	26	13,500 B.	Portsm'th	Greenock Foundry	1897	1899	866,516	6 H.N.	3–1	6 H.N.	12 H.N.	12–5 H.N.	5 H.N.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 8 *3-pr.*, & M.	4	18·5 *t*	800 1850	700
a.c.	**Carnarvon**	. 10,850	450	68½	25	21,489 Nic.&cyl.	Beardm're	Humphrys	1903	1905	890.840*	6–2 K.S.	2–¾	..	4½ K.S.	6 N.S.	6	4 *7·5-in.*, 6 *6-in.*, 25 *3-pr.*, 2 M.	2	23·3 *t*	800	655
b.	**Centurion**	. 23,000	555	89	27½	27,000 Y²	Devonp'rt	Hawthorn P.T.	1911	1913	1,953,855*	12	..	9	..	10	..	10 *13·5-in.*, 16 *4-*in. . .	3	21·5	900	909
a.c.	**Cochrane** .	. 13,550	480	73½	27	23,654 Y² & cyl.	Govan .	Fairfield .	1905	1907	1,193,121*	6–4–3 K.S.	¾–1	6	6	6	6	6 *9·2-in.*, 4 *7·5-in.*, 29 *3-pr.*, 2 M.	3	23·29 *t*	1000	704
b.	**Collingwood**	. 19,250	500	84	27	24,500 Y²	Devonp't	Hawthorn P.T.	1908	1910	1,731,640*	10–6–4	¾–1¾	8	..	9	..	10 *12-in.*, 20 *4-in.*, 5 M. .	3	21·5 *t*	900	724
b.	**Colossus** .	. 20,000	510	85	27	25,000 B. & W.	Greenock	Scott . P.T.	191	1911	1,672,663*	11–3	2½	8	..	11	..	10 *12-in.*, 16 *4-in.*, 5 M. .	3	21·5 *t*	900	780

* Total estimated cost of ship including guns.

‡ Particulars doubtful.

GREAT BRITAIN.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	**Commonwealth**	16,350	425	78	26¾	18,538 B & W & cyl	Govan .	Fairfield .	1903	1905	1,481,811*	9 H.S.	2–1	8–7	12 H.S.	12–6 H.S.	7 K.S.	4 *12-in.*, 4 *9·2-in.*, 10 *6-in.*, 12 *12-pr.*, 17 *3-pr.*, M.	4	19·01 *t*	950 / 2150	825
b.	**Conqueror** .	22,500	545	88½	27½	29,835 B. & W.	Dalmuir .	Beardmore P.T.	1911	1912	1,885,295*	12	..	9	..	10	..	10 *13·5-in.*, 16 *4-in.*, 5 M .	3	22·12	900 / 2700	800
a.c.	**Cornwall** . .	9800	440	66	24½	22,699 B. & W.	Pembroke	Hawthorn	1902	1904	756,274	4–2 H.S.	2–¾	..	5 N.S.	5–4 N.S.	4 N.S.	14 *6-in.*, 8 *12-pr.*, 5 *3-pr.*, 9 M.	2	23·68 *t*	800 / 1600	537
b.	**Cornwallis**	14,000	405	75½	26½	18,238 B.	Blackwall	Thames S. Co.	1901	1904	1,030,302	7 K.S.	2–1	7	14 K.S.	11–6 K.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 4 *3-pr.*, & M.	4	18·9 *t*	900 / 2000	750
a.c.	**Cressy** . shd.	12,000	440	69½	26¼	21,240 B.	Govan .	Fairfield .	1899	1901	749,324	6 K.S.	3–2	..	5 K.S.	6 K.S.	5 K.S.	2 *9·2-in.*, 12 *6-in.*, 12 *12-pr.*, 5 *3-pr.*, 8 M., 2 l.	2	20·79 *t*	800 / 1600	755
a.c.	**Cumberland** .	9800	440	66	24½	22,000 B.	Glasgow	London & Glasgow Co.	1902	1904	718,168	4–2 K.S.	2–¾	..	5	5–4	4 N.S.	14 *6-in.*, 8 *12-pr.*, 5 *3-pr.*, 9 M.	2	23·68 *t*	800 / 1000	537
a.c.	**Defence** . .	14,600	490	74½	26	27,570 Y²	Pembroke	Scotts S. & E. Co.	1907	1909	1,383,744*	6–4	1–½	3	..	8	7	4 *9·2-in.*, 10 *7·5-in.*, 16 *12-pr.*, 5 M.	5	23·5 *t*	1000	850
b.	**Delhi**‡ . .	25,000	580	90	28	29,000	Barrow .	Vickers . P.T.	Bldg.	..	..	12	..	9–8	..	..	..	10 *13·5-in.*, 12 *6-in.*, 6 *3-pr.*	4	21	900	..
a.c.	**Devonshire** .	10,850	450	68½	25	21,475 Nic. & cyl.	Chatham	Thames Ironworks	1904	1905	850,877*	6–2	2–¾	..	4½ K.S.	6 N.S.	6	4 *7·5-in.*, 6 *6-in.*, 25 *3-pr.*, 2 M.	2	22·97 *t*	800 / 1600	655
b.	**Dominion** .	16,350	425	78	26¾	18,438 B. & W. & cyl.	Barrow .	Vickers .	1903	1905	1,455,190*	9 K.S.	2–1	8–7 K.S.	12 K.S.	12–6 K.S.	7	4 *12-in.*, 4 *9·2-in.*, 10 *6-in.*, 12 *12-pr.*, 17 *3-pr.*, M.	4	19·5 *t*	950 / 2150	825
a.c.	**Donegal** . .	9800	440	66	24½	22,173 B.	Govan .	Fairfield Co.	1902	1903	715,947	4–2 K.S.	2–¾	..	5 K.S.	5–4	4 K.S.	14 *6-in.*, 8 *12-pr.*, 5 *3-pr.*, 9 M.	2	23·56 *t*	800 / 1600	537
a.c.	**Drake** . .	14,100	500	71	26	31,450 B.	Pembroke	Humphrys	1901	1902	1,002,977	6 K.S.	3–2	..	5 K.S.	6–5 K.S.	5 K.S.	2 *9·2-in.*, 16 *6-in.*, 12 *12-pr.*, 5 *3-pr.*, 2 M.	2	24·11 *t*	1250 / 2500	900
b.	**Dreadnought**	17,900	490	82	26½	27,500 B. & W.	Portsm'th	Vickers . P. T.	1906	1906	1,813,100*	11–6–4 K.C.	2¾–1¾	8	..	11	..	10 *12-in.*, 24 *12-pr.* Q.F., 5 M.	5	21·85 *t*	900 / 2700	770

a.c.	**Duke of Edinburgh**	13,550	480	73½	27	23,685 B. & W. & cyl.	Pembroke	Hawthorn Leslie	1904	1906	1,201,687*	6–4–3 K.S.	¾–1	6	6	6	6	6 *9·2-in.*, 10 *6-in.*, 25 *3-pr.*, 2 M.	3	22·84 *t*	1000	704
b.	**Duncan** . .	14,000	405	75½	26½	18,222 B.	Blackwall	Thames S. Co.	1901	1903	1,023,147	7 K.S.	2–1	7	14 K.S.	11–6 K.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 4 *3-pr.*, & M.	4	18·9 *t*	900 / 2000	750
a.c.	**Essex** . .	9,800	440	66	24½	22,000 B.	Pembroke	J. Brown .	1901	1903	739,946	4–2 K.S.	2–¾	..	5	5	4 K.S.	14 *6-in.*, 8 *12-pr.*, 5 *3-pr.*, 8 M., 2 l.	2	22·79 *t*	800 / 1600	537
a.c.	**Euryalus** . shd.	12,000	440	69½	26¼	21,318 B.	Barrow .	Vickers .	1901	1904	782,901	6 K.S.	3–2	2	5 K.S.	6 K.S.	5 K.S.	2 *9·2-in.*, 12 *6-in.*, 12 *12-pr.*, 5 *3-pr.*, 8 M.	2	21·63 *t*	800 / 1600	755
b.	**Exmouth** . .	14,000	405	75½	26½	18,346 B.	Birkenh'd	Laird .	1901	1903	1,032,409	7 K.S	2–1	7	14 K.S.	11–6 K.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 4 *3-pr.*, & M.	4	19·0	900 / 2000	750
b.	**Formidable** .	15,000	400	75	26¾	15,000 B.	Portsm'th	Earle .	1898	1901	1,022,745	9 H.S.	3–2	2	12 H.S.	12–5	8 K.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 4 *3-pr.*, & M.	4	18·13 *t*	900 / 2000	781
b.	**Glory** . .	12,950	390	74	26	13,500 B.	Birkenh'd	Laird .	1899	1901	841,014	6 H.N.	3–2	6 H.N.	12 H.N.	12–5 H.N.	5 H.N.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 8 *3-pr.*, & M.	4	18·12 *t*	800 / 1850	700
b.	**Goliath** . .	12,950	390	74	26	13,500 B.	Chatham.	Penn .	1898	1900	866,006									18·4 *t*		
a.c.	**Good Hope** .	14,100	500	71	26	31,071 B.	Govan .	Fairfield .	1901	1902	990,759	6 K.S.	3–2	..	5 K.S.	6–5 K.S.	5 K.S.	2 *9·2-in.*, 16 *6-in.*, 12 *12-pr.*, 5 *3-pr.*, 2 M.	2	23·5 *t*	1250 / 2500	900
a.c.	**Hampshire** .	10,850	450	68½	25	21,508 Y. & cyl.	Elswick .	Hawthorn.	1903	1905	866,527*	6–2 K.S.	2–¾	..	5 K.S.	5–4 N.S.	..	4 *7·5-in.*, 6 *6-in*, 25 *3-pr.*, 2 M.	2	23·47 *t*	800 / 1600	655
b.	**Hannibal** . .	14,900	390	75	27½	12,000	Pembroke	Harland .	1896	1897	906,799	9 H.S.	4–2½	9	14–9 H.S.	14–6 H.S.	6 H.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 6 *3-pr.*, 2 M., 2 l.	5	18·0 *t*	900 / 2200	757
b.	**Hercules** . .	20,000	510	85	27	25,700 Y²	Jarrow .	Palmer P.T.	1910	1911	1,660,950*	11–3	2½	8	..	11	..	10 *12-in.*, 16 *4-in.*, 5 M.	3	21·5 *t*	900	780
b.	**Hibernia** .	16,850	425	78	26¾	18,000 B.&W. & cyl.	Devonp'rt	Harland & Wolff	1905	1906	1,444,828*	9 H.S.	2–1	8–7	12 H.S.	12–6 H.S.	7 K.S.	4 *12-in.*, 4 *9·2-in.*, 10 *6-in.*, 12 *12-pr.*, 17 *3-pr.*, & M.	4	19·0	950 / 2150	825
b.	**Hindustan**					18,521 B.&W. & cyl.	Clydeb'nk	J. Brown .	1903	1905	1,454,526*	9 K.S.	2–1	8–7	12 K.S.	12–6 N.S.	7 N.S.			19·01 *t*		
a.c.	**Hogue** . shd.	12,000	440	69½	26¼	21,432 B.	Barrow .	Vickers .	1900	1902	749,809	6 K.S.	3	2 H.S.	5 K.S.	6 K.S.	5 K.S.	2 *9·2-in.*, 12 *6-in.*, 12 *12-pr.*, 5 *3-pr.*, 8 M., 2 l.	2	22·6 *t*	800 / 1600	755

* Total estimated cost of ship including guns.

‡ Particulars doubtful.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.	in.	in	in.	in.			knots.	tons.	
b.	**Illustrious**	14,900	390	75	27½	12,000	Chatham	Penn	1896	1898	894,585	9 H.S.	4–2½	9	14–9 H.S.	14–6 H.S.	6 H.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 6 *3-pr.*, 2 M., 2 l.	5	16·5 *t*	900 2200	757
b.	**Implacable**	15,000	400	75	26¾	15,000 B.	D'port	Laird	1899	1902	989,116	9 K.S.	3–2	2	12 K.S.	12–5 K.S.	6	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 4 *3-pr.*, & M.	4	18·2 *t*	900 2000	781
b.	**Irresistible**						Chatham	Maudslay	1898	1901	1,048,136											
b.c.	**Invincible**	17,250	530	78½	26	41,000 Y²	Elswick.	Humphrys P.T.	1907	1909	1,768,995*	7–4 K.C.	..	3	..	7	..	8 *12-in.*, 16 *4-in.*, 5 M.	5	26	1000	780
b.c.	**Inflexible**					41,000 Y²	Clydeb'k	J. Brown P.T.	1907	1908	1,728,229*											
b.c.	**Indomitable**					41,000 B. & W.	Govan	Fairfield P.T.	1907	1908	1,761,080*											
b.c.	**Indefatigable**	18,750	555	80	26½	43,000 B. & W.	Devonp'rt	J. Brown P.T.	1909	1911	1,536,769*	7–4	..	3	..	7	..	8 *12-in.*, 16 *4-in.*, 5 M.	2	25	1000	790
b.	**Iron Duke**¶	25,000	580	90	28	29,000	Portsm'th	Cammell Laird P.T.	1912	..	..	12	..	9–8	..	..	..	10 *13·5-in.*, 12 *6-in.*, 6 *3-pr.*	4	21	900	..
b.	**Jupiter**	14,900	390	75	27½	12,000	Clydeb'nk	Thomson	1895	1897	902,011	9 H.S.	4–2½	9	14–9 H.S.	14–6 H.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 6 *3-pr.*, 2 M., 2 l.	5	18·4 *t*	900 2200	757
a.c.	**Kent**	9800	440	66	24½	21,000 B.	Portsm'th	Hawthorn	1901	1903	700,283	4–2 K.S.	2–¾	..	5 K.S.	5–4 N.S.	4 K.S.	14 *6-in.*, 8 *12-pr.*, 5 *3-pr.*, 8 M., 2 l.	2	21·7 *t*	800 1600	537
b.	**King Edward VII.**	16,350	425	78	26¾	18,138 B. & W. & cyl.	Devonp'rt	Harland	1903	1905	1,473,245*	9 K.S.	2–1	8–7 K.S.	12 K.S.	12–6 N.S.	7	4 *12-in.*, 4 *9·2-in.*, 10 *6-in.*, 12 *12-pr.*, 17 *3-pr.*, M.	4	19·04 *t*	950 1200	825
b.	**King George V.**	23,000	555	89	27½	28,005 B. & W.	Portsm'th	Parsons P.T.	1911	1912	1,965,413*	12	..	9	..	10	..	10 *13·5-in.*, 16 *4-in.*	3	21·5	900	900
a.c.	**King Alfred**	14,100	500	71	26	30,893	Barrow	Vickers	1901	1903	978,125	6-5-4 K.S.	2½–1	..	5 K.S.	6–5 K.S.	5 K.S.	2 *9·2-in.*, 16 *6-in.*, 12 *12-pr.*, 5 *3-pr.*, 2 l.	2	23·46 *t*	1250 2500	900
a.c.	**Leviathan**					31,203 B.	Clydeb'nk	J. Brown			1,012,959									23·28 *t*		

a.c.	**Lancaster** .	9800	440	66	24½	22,000 B.	Elswick .	Hawthorn	1902	1904	732,858	4–2 K.S.	2–¾		5 K.S.	5–4 N.S.	4 K.S.	14 *6-in.*, 8 *12-pr.*, 5 *3-pr.*, 9 M.	2	24·01 *t*	800 / 1600	537
b.c.	**Lion** . .	26,350	660	88½	28	75,685 Y²	Devonport	Vickers . P.T.	1910	1912	2,086,458*	9	..	6	..	9	..	8 *13·5-in.*, 16 *4-in.*, 5 M. .	2	28·5 *t*	1000	980
b.	**London** .	15,000	400	75	26½	15,000 B.	Portsm'th	Earle .	1899	1902	1,036,393	9 K.S.	3–2	2	12 K.S.	12–5 K.S.	6	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 4 *3-pr.*, & M.	4	18·1 *t*	900 / 2000	781
b.	**Lord Nelson** .	16,500	410	79½	27	16,750 B. & W	Jarrow .	Palmer .	1906	1908	1,654,098*	12-6 K.C.		8	8	12	..	4 *12-in.*, 10 *9·2-in.*, 24 *12-pr.*, 5 M.	5	18·9 *t*	900 / 2200	747
b.	**Malaya¶** .	27,500	600	..	..	..	Walker .	..	Bldg.	..	..	..	..	..	..	..	..	8 *15-in.*	..	25	..	..
b.	**Magnificent**	14,900	390	75	27½	12,000	Chatham	Penn .	1894	1895	908,789									17·6 *t*		
b.	**Majestic** .	14,900	390	75	27½	12,000	Portsm'th	Barrow .	1895	1895	916,382	9 H.S.	4–2½	9	14–9 H.S.	14–6 H.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 6 *3-pr.*, 2 M., 2 l.	5	17·9 *t*	900 / 2200	757
b.	**Mars** .	14,900	390	75	27½	12,000	Birkenh'd	Laird .	1896	1897	902,402									17·7 *t*		
b.	**Marlborough¶**	25,000	580	90	28	29,000	Devonport	Hawthorn P.T.	1912	..	..	12	..	9–8	..	..	..	10 *13·5-in.*, 12 *6-in.*, 6 *3-pr.*	4	21	900	..
a.c.	**Minotaur** .	14,600	490	74½	26	27,856 Y²	Devonp'rt	Harland & Wolff	1906	1908	1,438,065*	6–4	1–½	6	..	8	7	4 *9·2-in.*, 10 *7·5-in.*, 16 *12-pr.*, 5 M.	5	23·01 *t*	1000	850
b.	**Monarch** .	22,500	545	88½	27½	28,555 Y²	Elswick .	Hawthorn. P. T.	1911	1912	1,886,912*	12	..	9	..	10	..	10 *13·5-in.*, 16 *4-in.* . .	3	21·88 *t*	900 / 2700	800
a.c.	**Monmouth** .	9800	440	66	24½	22,000 B.	Glasgow	London & Glasgow	1901	1903	979,591	4–2 K.S.	2–¾	4 K.S.	5 K.S.	5–4 N.S.	4 K.S.	14 *6-in.*, 8 *12-pr.*, 5 *3-pr.*, 8 M., 2 l.	2	22·58 *t*	800 / 1600	537
a.c.	**Natal** .	13,550	480	73½	27	23,592 Y² & Cyl.	Barrow .	Shipbg. Co. Vickers .	1905	1907	1,218,244*	6–4–3 K.S.	¾–1	6	6	6	6	6 *9·2-in.*, 4 *7·5-in.*, 29 *3-pr.*, 2 M.	3	23·33 *t*	1000	704
b.	**Neptune** .	19,900	510	85	27	27,721 Y²	Portsm'th	Harland & Wolff † P.T.	1909	1911	1,715,258*	11–3	2½	8	..	11	..	10 *12-in.*, 16 *4-in.*, 5 M. .	3	21·78 *t*	900	780
b.c.	**New Zealand¶**	18,800	555	80	26½	46,894 B. & W.	Govan .	Fairfield . P.T.	1911	1912	(‡)	..	..	..	..	..	..	8 *12-in.*, 16 *4-in.*, 5 M. .	2	25	1000	780
b.	**Ocean** .	12,950	390	74	25½	13,500 B.	Devonport	Hawthorn	1898	1900	883,778	6 H.N.	2–1	6	12 H.N.	12–5 H.N.	5 H.N.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 8 *3-pr.*, & M.	4 (4 sub.)	18·74 *t*	800 / 1850	700
b.	**Orion** .	22,500	545	88½	27½	29,108 B. & W.	Portsm'th	Wallsend . P. T.	1910	1911	1,918,773*	12	..	9	..	10	..	10 *13·5-in.*, 16 *4-in.*, 5 M. .	3	21·02 *t*	900 / 2700	800

* Estimated cost of ship including guns. † By arrangement with John Brown & Co. ‡ Built at the charge of the New Zealand Government. ¶ Particulars uncertain.

GREAT BRITAIN.—Armoured Ships—*continued.*

Class	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	**Prince George** .	14,900	390	75	27½	12,000	Portsm'th	Humphrys	1895	1896	895,504	9 H.S.	4–2½	9	14–9 H.S.	14–6 H.S.	6	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 6 *3-pr.*, 2 l.	5	18·3 *t*	900 2200	757
b.	**Prince of Wales**	15,000	400	75	26¾	15,000 B.	Chatham	Greenock Foundry	1902	1904	1,114,079	9 K.S.	2–1	3	12 K.S.	12–6 N.S.	6–2 K.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 4 *3-pr.*, & M.	4	18·0	900	781
b.c.	**Princess Royal** .	26,350	660	88½	28	76,510 Y^2	Barrow .	Vickers . P.T.	1911	1912	2,089,178*	9	..	6	..	9	..	8 *13·5-in.*, 16 *4-in.*, 5 M. .	2	28·5 *t*	1000	980
b.c.	**Queen Mary** .	27,000	660	89	28	75,000	Jarrow .	J. Brown . P.T.	1912	..	2,078,491*	9	..	6	..	9	...	8 *13·5-in.*, 16 *4-in.*, 5 M. .	2	28	1000	1000
b.	**Queen Elizabeth** ¶	27,500	600	..	..	60,000	Portsm'th	Wallsend . P.T.	Bldg.	..	..	..	..	..	..	..	..	8 *15-in.*	..	25	..	..
b.	**Queen** . .	15,000	400	75	26¾	15,000 B. & W.	Devonport	Harland & Wolff	1902	1904	1,074,999	9 K.S.	2–1	3	12 K.S.	12–6 N.S.	6–2 K.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 4 *3-pr.*, & M.	4	18·39 *t*	900	781
a.c.	**Roxburgh** . .	10,850	450	68½	25	22,102 D. & cyl.	Glasgow	London & Glasgow Company	1904	1905	862,077*	6–2 K.S.	2–¾	..	4½ K.S.	6 N.S.	6	4 *7·5-in.*, 6 *6-in.*, 25 *3-pr.*, 2 M.	2	23·63 *t*	800 1600	655
b.	**Russell** . .	14,000	405	75½	26½	18,229 B.	Jarrow .	Palmer .	1901	1903	1,037,995	7 K.S.	2·1	7 K.S.	14 K.S.	11–6 K.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 4 *3-pr.*, & M.	4	19·3 *t*	900 2000	750
b.	**St. Vincent** .	19,250	500	84	27	24,500 B. & W.	Portsm'th	Scott's S. . P.T.	1908	1910	1,754,615*	10	¾–1¾	8	..	9	..	10 *12-in.*, 20 *4-in.*, 5 M. .	3	21·9 *t*	900	780
a.c.	**Shannon** . .	14,600	490	75½	25	28,553 Y^2	Chatham	Humphrys	1906	1908	1,423,410*	6–4	1–½	3	..	8	..	4 *9·2-in.*, 10 *7·5-in.*, 16 *12-pr.*, 5 M.	5	22·49 *t*	950	850
a.c	**Suffolk** . .	9800	440	66	24½	22,000 Nic.	Portsm'th	Humphrys	1903	1904	722,681	4–2 K.S.	2–¾	..	5 K.S.	5–4 N.S.	4 K.S.	14 *6-in.*, 8 *12-pr.*, 5 *3-pr.*, 9 M.	2	24·7 *t*	800 1600	537
a.c.	**Sutlej** . shd.	12,000	440	69½	26¼	21,261 B.	Clydeb'nk	J. Brown .	1899	1902	755,690	6 K.S.	3–2	..	5 K.S.	6 K.S.	5 K.S.	2 *9·2-in.*, 12 *6-in.*, 12 *12-pr.*, 5 *3-pr.*, 8 M., 2 l.	2	21·77 *t*	800 1600	755

b.	**Superb** .	18,600	490	82	27	23,000 B. & W.	Elswick .	Wallsend . P. T.	1907	1909	1,660,446*	11-8-4 K.C.	..	8	..	11 K.C.	..	10 *12-in.*, 16 *4-in.* B.L., 5 M.	3	21·6 *t*	900	870
b.	**Temeraire** .					23,000 Y²	Devonp'rt	Hawthorn. P. T.	1907	1909	1,743,955*									22·07 *t*		
b.c.	**Tiger** ¶ .	28,000	..	..	..	100,000	Clydeb'nk	J. Brown . P. T.	Bldg.	..	..	..	..	..	..	..	..	8 *13 5-in.*, 12 *6-in.*	..	28	..	..
b.	**Swiftsure** .	11,800	436	71	24½	12,500	Elswick .	Humphrys, Tennant	1903	1904	845,036	7	3	7	..	10	7 K.S.	4 *10-in.*, 14 *7·5 in.*, 14 *14-pr.*, 2 *12-pr.*, 8 *6-pr.*, & M.	2	19·6 *t*	800 / 2000	700
b.	**Triumph** .						Barrow .	Vickers .	1903	1904	845,479											
b.	**Thunderer** .	22,500	545	88½	27½	27,604 B. & W.	Blackwall	Thames Ironworks P. T.	1911	1912	1,889,920*	12	..	9	..	10	..	10 *13·5-in.*, 16 *4-in.*, 5 M. .	3	21	900 / 2700	800
b.	**Valiant** ¶ .	27,500	600	..	..	60,000	Govan	Fairfield . P.T.	Bldg.	..	..	..	..	..	..	..	..	8 *15-in.*	..	25	..	..
b.	**Vanguard** .	19,250	500	84	27	24,500 B. & W.	Barrow .	Vickers . P. T.	1909	1910	1,607,781*	10	¾–1½	8	..	9	..	10 *12-in.*, 20 *4-in.*, 5 M. .	3	22·1 *t*	900	724
b.	**Venerable** .	15,000	400	75	26¾	15,345 B.	Chatham	Maudslay	1899	1902	1,092,753	7 K.S.	4–2½	3	14 K.S.	11–6 K.S.	6–2	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 4 *3-pr.*, & M.	4	18·3 *t*	900 / 2000	781
b.	**Vengeance** .	12,950	390	74	26	13,500 B.	Barrow .	Vickers .	1899	1901	836,417	6 K.S.	2–1	6	12 K.S.	12–6 K.S.	5 K.S.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 8 *3-pr.*, & M.	4	18·5 *t*	800 / 1850	750
b.	**Victorious** .	14,900	390	75	27½	12,000	Chatham	Hawthorn	1895	1897	885,212	9 H.S.	3–2½	9	14–9 H.S.	14–6 H.S.	6	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 6 *3-pr.*, 8 M., 2 L.	5 (4 sub.)	18·7 *t*	900 / 2200	757
a.c.	**Warrior** .	13,550	480	73½	27	23,641 Y² & cyl.	Pembroke	Wallsend .	1905	1907	1,186,395*	6–4–3 K.S.	¾–1	6	6	6	6	6 *9·2-in.*, 4 *7·5-in.*, 29 *3-pr.*, 2 M.	3	22·9 *t*	1000	704
b.	**Warspite** ¶ .	27,500	600	..	..	60,000	Devonp'rt	Hawthorn P.T.	Bldg.	..	..	..	..	..	..	..	..	8 *15-in.*	..	25	..	..
b.	**Zealandia** . (*ex* New Zealand.)	16,350	425	78	26¾	18,440 Nic. & Cyl.	Portsm'th	Humphrys	1904	1905	1,424,375*	9 K.S.	2–1	8–7 K.S.	12 K.S.	12–6 K.S.	7	4 *12-in.*, 4 *9·2-in.*, 10 *6-in.*, 12 *12-pr.*, 17 *3-pr.*, M.	4	18·59 *t*	950 / 2150	825
	5 Armoured ships‡.	Details not published.							Pro.													

* Total estimated cost of ship, including guns. ‡ Programme 1913–14. ¶ Particulars uncertain.

The battleships **Empress of India, Revenge, Ramillies, Resolution, Royal Oak,** and **Royal Sovereign** are on the subsidiary list.

GREAT BRITAIN.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt. / Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.			knots.	tons.	
P. 3rd cl. Cr.	Active . .	3440	385	$41\frac{1}{2}$	$13\frac{3}{4}$	18,000 Y.	Pembroke	Hawthorn. P.T.	1911	1911	272,977*	..	..	10 *4-in.* B.L., and M. .	2	26·0 *t*	350	320
„ „	Amphion . .	3440	385	$41\frac{1}{2}$	$13\frac{3}{4}$	18,000 Y.	Pembroke	Parsons . P.T.	1911	1913	277,781*	..	..	10 *4-in.* B.L., and M. .	2	25·0	350	320
Scout. .	Adventure .	2670	374	$38\frac{1}{4}$	$13\frac{1}{2}$	15,850 Y mod.	Elswick .	Hawthorn.	1904	1905	270,263	2	$\frac{3}{4}$	9 *4-in.*	2	25·42 *t*	227	268
P. 3rd cl. Cr.	Æolus . shd.	3600	300	43	$17\frac{1}{2}$	9000	Devonp'rt	Hawthorn.	1891	1893	213,180	2–1	2	2 *6-in.*, 6 *4·7-in.*, 13 *6-pr.*, *3-pr.*, M.	3	19·75	400 / 535	273
„ „	Amethyst . .	3000	360	40	$14\frac{1}{2}$	14,200 Y mod.	Elswick .	Parsons . P.T.	1903	1905	228,426	..	..	12 *4-in.*, 11 *3-pr.*, M. .	2	23·42 *t*	300	296
P. 1st cl. Cr.	Amphitrite shd.	11,000	435	69	$25\frac{1}{4}$	18,000 B.	Barrow .	Vickers .	1898	1900	552,795	4	3–6 H. S.	16 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 2 M.	2 (1 sub.)	20·75	1000	677
„ „	Argonaut . shd.	11,000	435	69	$25\frac{1}{4}$	18,000 B.	Govan .	Fairfield .	1898	1900	545,756	4	3–6 H. S.	16 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 2 M.	2 (1 sub.)	20·75	1000	677
„ „	Ariadne . shd.	11,000	435	69	$25\frac{1}{4}$	18,000 B.	Clydeb'nk	J. Brown .	1898	1900	541,927							
L. Cr.	Arethusa. .	..	410	..	..	30,000	Chatham	Fairfield .	Bldg.	..	..	..	..	..	..	29	..	..
„ „	Aurora .						Devonprt	Parsons .	Bldg,									
P. 3rd cl. Cr.	Astræa . shd.	4360	320	$49\frac{1}{2}$	19	9112	Devonp'rt	Devonport	1893	1894	254,217	2–1	3	2 *6-in.*, 8 *4·7-in.*, 1 *12-pr.*, 13 *6-pr.*, *3-pr.*, M.	3	19·75	400	312
Scout . .	Attentive . .	2670	374	$38\frac{1}{4}$	$13\frac{1}{2}$	16,212 Y.	Elswick .	Hawthorn .	1904	1906	270,263	2	$\frac{3}{4}$	9 *4-in.*	2	25·88 *t*	227	268
P. 3rd cl. Cr.	Barham . .	1830	280	35	$13\frac{1}{4}$	4700 T.	Portsm'th	Hawthorn .	1889	1890	113,702	2–1	2	6 *4·7-in.*, 6 *3-pr.*, M.	2	18·6	140	169

P. 3rd cl. Cr.	**Bellona** . .	3360	385	41½	13¾	18,000 Y.	Pembroke	Fairfield . P.T.	1909	1910	283,038*	½–1	..	6 *4-in.* B.L., and M. .	2	25·9 *t*	450	263
P. 2nd cl.	**Birmingham** .	5440	430	49·10	15·10	25,000	Elswick .	Hawthorn.	1912	..	351,415*	..	..	9 *6-in.*	2	25·5	650	..
P. 3rd. cl. Cr.	**Blanche** . .	3350	385	41½	13½	18,542 Y.	Pembroke	Hawthorn. P.T.	1909	1910	288,482*	..	..	10 *4-in.* B.L. and M. .	2	25·67 *t*	350	292
„ „	**Blonde** . .	3350	385	41½	13½	18,770 Y.	Pembroke	Cammell Laird P.T.	1910	1911	267,754*	..	..	10 *4-in.* B.L. and M. .	2	25·43 *t*	350	292
„ „	**Boadicea** . .	3300	385	41	13½	18,000 Y.	Pembroke	J. Brown . P.T.	1908	1909	330,631*	½–1	..	6 *4-in.*, B.L. and M. .	2	25·75 *t*	450	263
P. 2nd cl. Cr.	**Bristol** . .	4800	430	47	15¼	24,529 Y.	Clydeb'nk	J. Brown . C.T.	1910	1910	364,953*	2–¾	..	2 *6-in.*, 10 *4-in.* B.L., 1 *12-pr.*, 4 M.	2	26·84	650	376
P. 3rd cl. Cr.	**Cambrian**. shd.	4360	320	49½	19	9000	Pembroke	Hawthorn.	1893	1894	244,725	2–¾	2	2 *6-in.*, 8 *4·7-in.*, 1 *12-pr.*, 13 *6-pr.*, *3-pr.*, M.	3	19·5	400	312
P. 2nd cl. Cr.	**Challenger** .	5880	355	56	21¼	12,500 B.&W	Chatham	Wallsend Eng'ng Co.	1902	1904	360,194	3–2	..	11 *6-in.*, 9 *12-pr.*, 1 *3-pr.*, 2 M.	2	21·0	500	454
P. 3rd cl. Cr.	**Charybdis** shd.	4360	320	49½	19	9000	Sheerness	Earle .	1893	1895	241,029	2–1	2	2 *6-in.*, 8 *4·7-in.*, 1 *12-pr.*, 13 *6-pr.*, *3-pr.*, M.	3	19·5	400	312
P. 2nd cl. Cr.	**Chatham** . .	5400	430	49¾	15¾	25,901 Y.	Chatham.	Thames Ironworks P.T.	1911	1912	349,358*	3 –	..	8 *6-in.*, 4 *3-pr.*, 4 M., 1 l.	2	25·5	650	400
„ „	**Crescent** . shd.	7700	360	60	23¾	12,000	Portsm'th	Penn .	1892	1894	392,453	5–1	6	1 *9·2-in.*, 12 *6-in.*, 1 *12-pr.*, 19 *6-pr.*, *3-pr.*, M.	2 (1 sub.)	19·7	850	560
„ „	**Dartmouth** .	5250	430	48½	15½	23,467 Y.	Barrow .	Vickers . P.T.	1911	1911	329,406*	2–¾	..	8 *6-in.*, 4 *3-pr.*, 4 M. .	2	25·9 *t*	650	390
P. 1st cl. Cr.	**Diadem** . shd.	11,000	435	69	26	16,500 B.	Govan .	Fairfield .	1896	1899	554,863	4–2½	4½–2	16 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 2 M.	2 (1 sub.)	20·5	1000	357
P. 3rd cl. Cr.	**Diamond** . .	3000	360	40	14½	10,066 N. L.	Birkenh'd	Laird .	1904	1905	231,010	..	..	12 *4-in.*, 11 *3-pr.*, M.	2	22·17 *t*	300	296
P. 2nd cl. Cr.	**Diana** . shd.	5600	350	54	21	9600	Govan .	Fairfield .	1895	1898	253,009				3	19·5	550	449
„ „	**Dido** . . shd.	5600	350	54	21	9600	Glasgow.	London and Glasgow Co.	1896	1898	254,190	2½	3	11 *6-in.*, 9 *12-pr.*, 1 *3-pr.*, 5 M., 1 l.				
„ „	**Doris** . shd.	5600	350	54	21	9600	Barrow .	Vickers .	1896	1898	256,306				3 (2 sub.)	19·5	550	449

* Total estimated cost of ship including guns.

GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt. / Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.			knots.	tons.	
P. 2nd cl. Cr.	**Dublin** . .	5400	430	49·10	$15\frac{3}{4}$	25,000 Y.	Dalmuir .	Beardmore P. T.	1912	1913	337,565*	3 / —	..	8 *6-in.*, 4 *3-pr.*, 4 M., 1 l.	2	25·5	650	400
,, ,,	**Eclipse** . shd.	5600	350	53	$20\frac{1}{4}$	9600	Portsm'th	Portsm'th	1894	1897	276,313	$1\frac{1}{2}$–3	3	5 *6-in.*, 6 *4·7in.*, 9 *12-pr.*, 1 *3-pr.*, 5 M., 1 l.	3	19·5	550	456
,, ,,	**Edgar** . .	7350	360	60	$23\frac{3}{4}$	12,000	Devonp'rt	Fairfield .	1890	1893	410,980	5–1	6	2 *9·2-in.*, 10 *6-in.*, 2 *12-pr.*, 19 *6-pr.*, *3-pr.*, M.	4	20·5	850	544
,, ,,	**Endymion** .	7350	360	60	$23\frac{3}{4}$	12,000	Hull .	Earle .	1891	1894	375,350	5–1	6	2 *9·2-in.*, 10 *6-in.*, 1 *12-pr.*, 19 *6-pr.*, *3-pr.*, M.	2	20·5	850	544
P. 1st cl. Cr.	**Europa** . shd.	11,000	435	69	26	16,500 B.	Clydeb'nk	Thomson .	1897	1899	564,690	4–$2\frac{1}{2}$	$4\frac{1}{2}$–2	16 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 2 M.	2	20·5	1000	357
P. 2nd cl. Cr.	**Falmouth** . .	5250	430	$48\frac{1}{2}$	$15\frac{1}{2}$	23,467 Y.	Dalmuir .	Beardmore P. T.	1910	1911	337,473*	2–$\frac{3}{4}$	..	8 *6-in.*, 4 *3-pr.*, 4 M.	2	25·5	650	390
P. 3rd cl. Cr.	**Fearless** . .	3440	385	41·6	13·9	18,000	Pembroke	Beardmore P.T.	1912	..	..	..	..	10 *4-in.*	..	25·0	350	320
,, ,,	**Flora** . shd.	4360	320	$49\frac{1}{2}$	19	9000	Pembroke	Vickers .	1893	1895	242,276							
,, ,,	**Forte**. . shd.	4360	320	$49\frac{1}{2}$	19	9000	Chatham	Chatham .	1893	1895	240,571	2–1	2	2 *6-in.*, 8 *4·7-in.*, 1 *12-pr.*, 13 *6-pr.*, *3-pr.*, M.	3	19·5	400	312
,, ,,	**Fox** . . shd.	4360	320	$49\frac{1}{2}$	19	9000	Portsm'th	Portsm'th	1893	1895	245,571							
Scout . .	**Foresight** .	2850	360	39	14	14,277 T.	Govan .	Fairfield .	1904	1905	285,672	$1\frac{1}{2}$–$\frac{5}{8}$	..	9 *4-in.*	2	25·12 *t*	250	268
,, . .	**Forward** .					15,018 T.					285,326					25·15 *t*		
L. Cr. .	**Galatea** . .	..	410	..	..	30,000	Dalmuir .	Beardmore	Bldg.	..	..	..	..	..	..	29	..	..

P. 2nd cl. Cr	**Gibraltar** . shd.	7700	360	60	23¾	12,000	Glasgow .	Napier .	1892	1894	373,236	5–1	6	2 *9·2-in.*, 10 *6-in.*, 1 *12-pr.*, 19 *6-pr.*, *3-pr.*, M.	2	19·7	850	544
„ „	**Glasgow** . .	4800	430	47	15½	22,472 *t*	Govan .	Fairfield P. T.	1909	1910	354,884*	2–¾	..	2 *6-in.*, 10 *4-in.*, 1 *12-pr.*, 4 M.	2	25·8 *t*	650	376
„ „	**Gloucester** . .					23,757 *t*	Dalmuir	Beardmore P. T.			353,856*					26·29 *t*		
„ „	**Grafton** . .	7350	360	60	23¾	12,000	Blackwall	Humphrys	1892	1894	372,890	..	6	2 *9·2-in.*, 10 *6-in.*, 1 *12-pr.*, 19 *6-pr.*, *3-pr.*, M.	2	20·0	850	560
„ „	**Hawke** . .	7350	360	60	23¾	12,000	Chatham .	Fairfield .	1891	1893	400,702	5–1	6	2 *9·2-in.*, 10 *6-in.*, 1 *12-pr.*, 19 *6-pr.*, *3-pr.*, M.	2	20·0	850	544
„ „	**Hermes** . shd.	5600	350	54	20½	10,000 B. & W.	Govan .	Fairfield .	1898	1900 1902	281,776	1½–3	3	11 *6-in.*, 9 *12-pr.*, 1 *3-pr.*, 2 M.	2	20·0	600	456
„ „	**Highflyer** shd.	5600	350	54	20½	10,000 B.	Govan .	Fairfield .	1898	1900	280,182							
„ „	**Hyacinth** . shd.	5600	350	54	20½	10,000 B.	Glasgow .	London and Glasgow Co.	1898	1901	288,595							
P. 3rd cl. Cr.	**Hermione** shd.	4360	320	49½	19	9000	Devonp'rt	Thomson .	1893	1895	223,324	2–1	2	2 *6-in.*, 8 *4·7-in.*, 1 *12-pr.*, 13 *6-pr.*, *3-pr.*, M.	3	19·5	400	312
T. G. B. .	**Hussar** . .	1070	250	30½	9	3500	Devonp'rt	Hawthorn .	1894	1895	72,313	..	2	1 *4·7-in.*, 2 *6-pr.*, M. .	5	19·0	100	120
L. Cr. .	**Inconstant** .		410	..	..	30,000	Dalmuir .	Beardmore	Bldg.	..	..	..	..	..	..	29	..	..
P. 2nd cl. Cr.	**Isis** . . shd.	5600	350	54	21	9600	Glasgow .	London and Glasgow Co.	1896	1898	253,733	2½	3	11 *6-in.*, 9 *12-pr.*, 1 *3-pr.*, 5 M., 1 l.	3 (2 sub.)	19·5	550	449
„ „	**Juno** . shd.	5600	350	54	21	9600	Barrow .	Vickers .	1895	1898	256,106							
„ „	**Liverpool** . .	4800	430	47	15½	24,614 Y.	Barrow .	Vickers . P.T.	1909	1910	344,871*	2–¾	..	2 *6-in.*, 10 *4-in.* B.L., 1 *12-pr.*, 4 M.	2	26·17 *t*	650	376
„ „	**Lowestoft** .	5440	430	49·10	15·10	25,000	Chatham	Fairfield .	1913	..	359,702*	..	..	9 *6-in.*	2	25·5	650	..
3rd cl. Cr. .	**Medea** . .	2800	265	41	16½	7500 Y.	Chatham .	Humphrys	1888	1889 1905	171,874	..	1½	6 *4·7-in.*, 13 *6-pr.*, *3-pr.*, M.	4	19·0	400	218
P. 3rd cl. Cr.	**Melpomene** . (*ex*-Indefatigable) shd.	3600	300	43¾	17½	9000	Glasgow .	London and Glasgow Co.	1891	1892	183,568	2–1	2	2 *6-in.*, 6 *4·7-in.*, 13 *6-pr.*, *3-pr.*, M.	3	19·75	400	273

* Total estimated cost of ship, including guns.

GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Makers of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt. / Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.			knots.	tons.	
P. 2nd cl. Cr.	**Minerva** . shd.	5600	350	53	20½	9600	Chatham.	Chatham .	1895	1897	275,331	1½-3	3	11 *6-in.*, 9 *12-pr.*, 1 *3-pr.*, 5 M., 1 l.	3 (2 sub.)	19·5	550	416
,, ,,	**Newcastle** .	4800	430	47	15¼	24,669 Y.	Elswick .	Wallsend Engineering Co. P.T.	1909	1910	352,610*	2–¾	..	2 *6-in.*, 10 *4-in.* B.L., 1 *12-pr.*, 4 M.	2	26·26 *t*	650	376
,, ,,	**Nottingham** .	5440	430	49·10	15·10	25,000	Pembroke	Hawthorn	1912	..	360,051*	..	..	9 *6-in.*	2	25·5	650	..
P. Scout .	**Pathfinder**	2940	370	38¾	14	17,176 L.N.	Birknhd.	Laird .	1904	1905	273,147	½–⅝	..	9 *4-in.*	2	25·34 *t*	300	268
,, .	**Patrol** .					16,460					273,523					25·06 *t*		
P. 3rd cl. Cr.	**Pandora** .	2200	305	36¾	13½	7000 T.	Portsm'th	Portsm'th	1900	1901	165,218							
,, ,,	**Pegasus** .	2135	300	36½	17	7000 R.	Jarrow .	Palmer .	1897	1899	134,919							
,, ,,	**Pelorus** .	2135	300	36½	17	7000 Nor.	Sheerness	Thomson .	1896	1897	154,315							
,, ,,	**Perseus** .	2135	300	36½	13½	7000 T.	Hull	Earle .	1897	1901	133,461	2	·22	8 *4-in.*, 11 *3-pr.*, M.	2	20·0	250 / 517	234
,, ,,	**Prometheus** .	2135	300	36½	13½	7000 T.	Hull .	Earle .	1898	1901	131,743							
,, ,,	**Psyche** .	2200	305	36¾	17½	7000 T.	Devonp'rt	Devonport	1898	1900	156,890							
,, ,,	**Proserpine** .	2135	300	36½	17	7000 T.	Sheerness	Devonport	1896	1899	165,020							
,, ,,	**Pyramus** .	2135	300	36½	13½	7000 R.	Jarrow .	Palmer .	1897	1900	135,249							
L. Cr. .	**Penelope** .	..	410	..	..	30,000	Barrow .	Vickers .	Bldg.	..	..	..	..	..	..	29	..	..

L. Cr.	Phaeton	..	410	..	..	30,000	Barrow	Vickers	Bldg.	..	..	..	..	..	..	29	..	..
P. 3rd cl. Cr.	**Philomel**	2575	265	41	15½	7500	Devonp'rt	Earle	1890	1892	163,699	2–1	2	8 *4·7-in.*, 12 *3-pr.*, M.	2	19·0	300	217
P. 2nd cl. Cr.	**Royal Arthur** shd.	7700	360	60	27¾	12,000	Portsm'th	Maudslay	1891	1893	412,033	5–1	6	1 *9·2-in.*, 12 *6-in.*, 1 *12-pr.*, 19 *6-pr.*, *3-pr.*, M.	2 (2 sub.)	19·7	850	567
L. Cr.	Royalist	..	410	..	..	30,000	Dalmuir	Beardmore	Bldg.	..	..	..	..	..	..	29	..	..
P. 3rd cl. Cr.	**Sapphire**	3000	360	40	14½	10,200	Jarrow	Palmer	1904	1905	226,277	..	..	12 *4-in.*, 11 *3-pr.*, M.	2	22·45 *t*	300	296
,, ,,	**Sappho**	3400	300	43	16½	9861	Poplar	Penn	1891	1893	176,813	2–1	2	2 *6-in.*, 6 *4·7-in.*, *6-pr.*, 13 *3-pr.*, M.	4	20·47	400	273
P. Scout	**Sentinel**	2895	360	40	14¼	17,488 Nor. V.E.	Barrow	Vickers	1904	1905	276,344	1½–⅝	..	9 *4-in.*	2	25·07 *t*	205	268
P. 3rd cl. Cr.	**Sirius** shd.	3600	300	43¾	17½	9000	Elswick	Maudslay	1890	1892	190,991	2–1	2	2 *6-in.*, 6 *4·7-in.*, 13 *6-pr.*, *3-pr.*, M.	4	19·75	400	273
P. Scout	**Skirmisher**	2895	360	40	14¼	17,053 Nor.	Barrow	Vickers	1905	1905	276,579	1½–⅝	..	9 *4-in.*	2	25·19	205	268
P. 2nd cl. Cr.	**Southampton**	5400	430	49·10	15¾	25,000 Y.	Clydeb'nk	J. Brown C.T.	1912	1913	336,469*	3 –	..	8 *6-in.*, 4 *3-pr.*, 4 M., 1 l.	2	25·5	650	400
P. 1st cl. Cr.	**Spartiate** shd.	11,000	435	69	26	18,658	Pembroke	Maudslay	1898	1902	654,661	4–2½	4½–2	16 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 2 M.	2 (2 sub.)	21·0 *t*	1000	600
T. B. D.	**Swift**	1800	345	34⅛	10½	30,000 L.Y.	Birkenh'd	Cammell Laird	1907	1909	241,595*	..	..	4 *4-in.*	..	35·25	180 Oil	150
P. 2nd cl. Cr.	**Talbot** shd.	5600	350	53½	21	9600	Devonpr't	Devonport	1895	1897	263,699	1½–3	3	11 *6-in.*, 9 *12-pr.*, 1 *3-pr.*, 5 M., 1 l.	3 (2 sub.)	19·5	550	412
P. 1st cl. Cr.	**Terrible** shd.	14,200	500	71	27	25,000 B.	Glasgow	Thomson	1895	1898	708,619	3–6	6	2 *9·2-in.*, 16 *6-in*, 14 *12-pr.*, 14 *3-pr.*, 9 M.	4	22·4	1500/3000	840
P. 2nd cl. Cr.	**Theseus**	7350	360	60	23¾	12,000	Blackwall	Maudslay	1892	1894	370,359	5–1	6	2 *9·2-in.*, 10 *6-in.*, 1 *12-pr.*, 19 *6-pr.*, *3-pr.*, M.	2 (2 sub.)	20·0	850	544

* Total estimated cost of ship, including guns.

GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt. / Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.			knots.	tons.	
P. 3rd cl. Cr.	**Topaze**	3000	360	40	14½	9860 L.N.	Birkenh'd	Laird	1903	1905	242,444	..	..	12 *4-in.*, 11 *3-pr.*, M.	2	22·1 t	300	296
L. Cr.	**Undaunted**	..	410	..	..	30,000	Govan	Fairfield	Bldg.	..	..	..	..	..	..	29	..	..
P. 2nd cl. Cr.	**Venus** shd.	5600	350	54	21¼	9600	Govan	Fairfield	1895	1898	254,184	2½	3	11 *6-in.*, 9 *12-pr.*, 1 *3-pr.*, 5 M., 1 L.	3 (2 sub.)	19·5	550	449
" "	**Vindictive**	5750	320	54	20½	10,000 B.	Chatham	Chatham	1897	1897	282,879	1–2 N.S.	3	10 *6-in.*, 9 *12-pr.*, 1 *3-pr.*, 5 M., 1 L.	2	20·1	500	429
" "	**Weymouth**	5250	430	48½	15½	22,000 Y.	Elswick	Parsons P. T.	1910	1911	337,738*	2¾	..	8 *6-in.*, 4 *3-pr.*, 4 M.	2	25·5 t	650	390
" "	**Yarmouth**						Glasgow	London & Glas. Co. C. T.	1911	1912	353,238*							

* Total cost, including guns.

River Gunboats.—**Robin, Nightingale, Snipe, Sandpiper** (1897), 85 tons; **Woodcock, Woodlark** (1898), 150 tons, 2 6-prs., 4 Maxims; **Kinsha** (1901), 616 tons, **Teal, Moorhen** (1902), 180 tons, 2 6-prs., 13 knots; **Widgeon** (1905), 195 tons. *Despatch Vessels.*—**Alacrity** (1885), 1,700 and 1,650 tons. *Torpedo Gunboats* (some serving as mine sweepers).—**Circe, Gossamer, Dryad, Halcyon, Harrier, Jason, Leda, Niger, Seagull, Skipjack, Spanker, Speedwell,** and **Speedy.**

The following vessels have been struck off the effective list, but the armaments have not in every case been removed:—*Cruisers:* **Andromeda, Brilliant, Scylla, Powerful, Furious,** and **Terpsichore.** The following small craft have been placed on a "Special Service List" of "unprotected ships": **Sphinx, Lapwing, Redbreast** (East Indies), **Ringdove** (Fishery P.), **Pomone** (special service), **Dwarf** (W. C. Africa), **Shearwater** (British Columbia), **Bramble, Britomart, Thistle, Clio,** and **Cadmus** (China).

The following vessels are employed on special service:—**Assistance** and **Cyclops,** fleet repair ships; **Woolwich, Blake, Blenheim, Hecla, Leander, St. George,** and **Tyne,** torpedo depot ships; **Maidstone, Adamant, Alecto, Arrogant, Bonaventure, Forth, Mercury, Pactolus, Thames, Vulcan, Dolphin, Onyx, Antelope, Hebe, Sharpshooter,** and **Hazard,** submarine depôt ships; **Aquarius,** distilling vessel; **Iphigenia, Apollo, Naiad, Intrepid, Andromache, Latona,** and **Thetis,** mine-laying vessels; and **Seaflower, Seamew, Sparrow, Spider,** and **Driver,** steam-trawlers for mine-sweeping duties, purchased April, 1909.

One destroyer depôt ship, one fleet repair ship, and one hospital ship, the **Mediator,** purchased 1913.

Defence Forces of the Dominions.

AUSTRALIA.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt. / Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.			knots.	tons.	
b.c. . .	Australia . .	18,800	555	80	26½	44,000	Clyde-bank	J. Brown . P.T.	1911	..	..	..	..	8 *12*-in., 16 *4-in.*, 5 M.	2	25·0	1000	790
P. 2nd cl. Cr.	Melbourne .						Birken-head	Cammell Laird	1912	1913								
„ „	Sydney . .	5400	430	49½	15¾	25,000	Glasgow	London & Glasgow Co.	1912	..	..	..	..	8 6-in., 4 *3-pr.*, 4 M., 1 l.	2	25·5	..	..
„ „	Brisbane . .						Sydney	..	Bldg.	..								
„ „	Encounter .	5880	355	56	20¼	12,500 Durr	Devonp'rt	Devonport Dockyard .	1903	1906	370,275	3–2	..	11 *6-in.*, 9 *12-pr.*, 1 *3-pr.*, 2 M.	2	20·75 to 21·0	600	454
L. Cr.	Pioneer . .	2200	305	36¾	13½	7000 T.	Chatham.	Fairfield .	1899	1900	148,894	2	·22	8 *4-in.*, 11 *3-pr.*, M. .	2	20·0	250 517	234

CANADA.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt. / Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
P. 1st cl. Cr.	Niobe . .	11,000	435	69	26	16,500	Barrow .	Vickers .	1897	1899	..	..	..	16 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 2 M.	2	20·5	1000	600
P. 2nd cl. Cr.	Rainbow . shd.	3600	300	43¾	17½	9000	Jarrow .	Palmer .	1891	1893	..	..	..	2 *6-in.*, 6 *4·7-in.*, 8 *6-pr.*, 1 *3-pr.*, 4 M., 1 l.	4	19·7	400	273

Royal Naval Reserved Merchant Cruisers.

—	Name.	Owners.	Length.	Breadth.	Draught of Water for the Admiralty List.	Gross Tonnage.	Indicated Horse-Power.	Ocean Speed.
			Feet.	Feet.	Feet.	Tons.		Knots.
Ships in receipt of an annual subvention and permitted to fly the blue ensign.	Mauretania	Cunard Co.	785	88	33·6	31,938	68,000	26·6* t
	Lusitania	„	785	88	33·6	31,550	68,000	26·6* t

* Speed of best day's run, 1910.

In addition to the above, the Cunard Company holds all vessels for the time being the property of the Company at the disposal of His Majesty's Government for hire or purchase.

ARGENTINE REPUBLIC.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.				Gun Position.		Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Heavy Guns.	Second-ary.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	**Garibaldi**	6732	328	59¾	24	13,384	Sestri Ponente	1895	1896	752,000	6–3 H.S.	1½	6 H.S.	6 H.S.	6 H.S.	6 H.S.	2 *10-in.*, 10 *6-in.*, 6 *4·7-in.*, 4 *2·2-in.*, 2 M.	2	19·9 *t*	1000	500
a.c.	**General Belgrano**	7069	328	59¾	24	13,000	Leghorn	1897	1899	696,700	6–3 H.S.	1½	6 H.S.	6 H.S.	6 H.S.	6 H.S.	2 *10-in.*, 14 *6-in.*, 2 *8-in.*, 4 *2·2-in.*, 2 L., 2 M.	4	20·1 *t*	1000	500
a.c.	**General San Martin**	6773	328	59¾	24	13,000	Leghorn	1896	1898	688,200	6–3 H.S.	1½	6 H.S.	6 H.S.	6 H.S.	6 H.S.	4 *8-in.*, 10 *6-in.*, 6 *4·7-in.*, 4 *2·2-in.*, 2 L., 2 M.	4	19·8	1100	500
c.d.s.b.	**Independencia**	2336	230	44½	13	3000	Birkenhead	1891	1893	176,000	8 *comp.*	2	..	8 *comp.*	8 *comp.*	..	2 *9·4-in.*, 4 *4·7-in.* (A), 4 *3-pr.* (A), 4 M.	..	14·4 *t*	340	225
c.d.s.b.	**Libertad**	2336	230	44½	13	3000	Birkenhead	1890	1892	176,000											
b.	**Moreno** / **Rivadavia**	27600*	585	98	27½	39.500 B. & W. Curtis t.	Quincy, Mass. / Camden, N.J. (N.Y.S. Co.)	1911	..	2,200,000	12–10 K.S.	3–2	9–6 K.S.	9 K.S.	12–9 K.S.	6 K.S.	12 *12-in.*, 16 *6-in.*, 16 *4-in.*, 10 smaller.	2 sub.	22·5	1600 / 4000	1046
a.c.	**Pueyrredon**	6773	328	59¾	24	13,000 B.	Sestri Ponente	1898	1901	782,000	6–3 H.S.	1½	6 H.S.	5 H.S.	6 H.S.	6 H.S.	2 *10-in.*, 10 *6-in.*, 6 *4·7-in.*, 4 *2·2-in.*, 2 M.	4	20·1 *t*	1000	500

* Normal; 30,000 tons full load; oil fuel 600 tons.

ARGENTINE REPUBLIC.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
cr.	Buenos Aires	4780	396	47¼	19	17,000	Elswick	1895	1895	383,000	..	4½	2 *8-in.* (A.), 4 *6-in.*, 6 *4·7-in.*	8	23·2 *t*	1000	429
to.g.b.	Espora	520	210	25	8	3500 Y	Birkenhead	1890	1891	..	..	..	2 *8-in.*, 4 *1·8-in.*, 2 M.	5	20·0	180	124
cr.	Nueve de Julio	3570	354	44	19½	14,350	Elswick	1892	1892	298,000	4½	4½	4 *6-in.* (A.), 8 *4·7-in.*, 4 *3-pr.*	5	22·74 *t*	770	300
to.g.b.	Paraná	1000	240	32¼	7½	..	Elswick	1908	1909	..	1	3–2*	2 *6-in.* Howitzers, 6 *12-pr.*, 8 M., 4 *12-pr.* field.	..	15·0	120	150
to.g.b.	Patria	1070	250	31	10	4500	Birkenhead	1893	1894	87,000	..	..	2 *4·7-in.*, 4 *8-pr.*, 2 *3-pr.*, 2 M.	5	20·75 *t*	288	159
to.g.b.	Rosario	1000	240	32¼	7½	..	Elswick	1908	1909	..	1	3–2*	2 *6-in.* Howitzers, 6 *12-pr.*, 8 M., 4 *12-pr.* field.	..	15·0	120	150
cr.	25 de Mayo	3200	325	43	16	13,800	Elswick	1890	1892	260,000	4½	4½	2 *8·2-in.* (A.), 8 *4·7-in.*, 4 *3-pr.*	6	22·43 *t*	600	185

* Side.

The training-ship (cruiser) Presidente Sarmiento, 2750 tons, 2000 I.H.P. (locomotive and Niclausse boilers), and 13 knots speed, with 19 guns and three torpedo tubes; launched by Messrs. Laird, 1897. There are several small gunboats.

AUSTRIA-HUNGARY.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Deck.	Side above belt.	Bulkhead.	Gun Position. Heavy Guns.	Second-ary.	Armament. Guns.	Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	Arpád . Babenberg	8208	354¼	65¾	23¼	15,000 B.	Trieste	1901 1902	1903 1904	0 657,900 66 ,000	8½ K.S.	2½	4 K.S.	8 K.S.	8¼ K.S.	5 K.S.	3 *9·4-in.*, 12 *5·9-in.*, 10 *2·8-in.*, 8 M., 2 l.	2 (sub)	19·6 *t*	500 840	638
c.d.s.	Budapest .	5462	305	55¾	21	9185 B.	Trieste .	1896	1897	400,600	10½ H.S.	2½	3¼ H.S.	8 H.S.	10½ H.S.	3¼ H.S.	4 *9·4-in.*, 6 *5·9-in.*, 12 *1·8-in.*, 6 M., 2 l.	4	17·8 *t*	500	450
b. b. b.	Erz. Friedrich Erz. Karl Erz. Ferdinand Max	10433	390½	72¼	24½	18,130 *t* 18,000 Y.	Trieste	1904 1903 1905	1906 1906 1907	912,500	8¼ K.S.	3	5 K.S.	8 K.S.	9¼ K.S.	7 K.S.	4 *9·4-in.*, 12 *7·5-in.*, 12 *2·8-in.*, 6 *1·8-in.*, 8 M., 2 l.	2 sub.	20·56 *t* 20·36 *t* 20·0	1815	875
b.	Erz. Franz Ferdinand	14226	450¾	80½	26½	26,000 Y. *t*	Trieste .	1908	1910	..	9–7½ K.S.	2	6 K.S.	6 K.S.	10 K.S.	8 K.S.	4 *12-in.*, 8 *9·4-in.*, 20 *3·9-in.*, 6 *12-pr.*, 2 M.	3 sub.	20·6 *t*	750 1200	816
b.	Habsburg .	8208	354¼	65¾	23¼	15,000 B.	Trieste .	1900	1902	626,000	8½ H.S.	2½	4 H.S.	8 H.S.	8¼ H.S.	5 H.S.	3 *9·4-in.*, 12 *5·9-in.*, 10 *2·8-in.*, 8 M., 2 l.	2 (sub)	19·6 *t*	500 840	638
a.c	Kaiserin Maria Theresia	5187	351	52½	21¼	9755	Trieste .	1893	1895 1910	304,187	4	2	..	4	4	4	2 *7·5-in.*, 8 *5·9-in.*, 2 *2·8-in.*, 14 *1·8-in.*, 5 M., 2 l.	4	19·0	740	502
a.c	Kaiser Karl VI.	6151	367½	56	20¼	12,800 B.	Trieste .	1898	1900	429,000	10 H.S.	1½	6 H.S.	8 H.S.	8¾ H.S.	6 H.S.	2 *9·4-in.*, 8 *5·9-in.*, 16 *1·8-in.*, 4 M., 2 l.	4	20·7 *t*	800	535
c.d.s.	Monarch .	5550	305	55¾	21	8900	Pola .	1895	1898	399,062	10½ H.S.	2½	3¼ H.S.	8 H.S.	10½ H.S.	3¼ H.S.	4 *9·4-in.*, 6 *5·9-in.*, 12 *1·8-in.*, 6 M., 2 l.	4	17·4 *t*	500	450
b.	Prinz Eugen	20000	495	89½	27	25,000 P. tur. Y.	Trieste .	1912	..	2,500,000	11–4¾ K.S.	2½	6 K.S.	..	12 K.S.	6 K.S.	12 *12-in.*, 12 *5·9-in.*, 18 *12-pr.*, 6 smaller	4 (sub)	20·5	900 2000	1000
b.	Radetzky .	14226	450¾	80½	26½	20,000 Y.	Trieste .	1909	1910	..	9–7½ K.S.	2	6 K.S.	6 K.S.	10 K.S.	8 K.S.	4 *12-in.*, 8 *9·4-in.*, 20 *3·9-in.*, 6 *12-pr.*, 2 M.	3 (sub)	20·5	750 1200	816
a. c.	St. Georg .	7185	383¾	61¾	21¼	15,270 *t*, Y.	Pola .	1903	1906	581,583	8½–6½ K.S.	1½	5 K.S.	7 K.S.	8½–5½ K.S.	6 K.S.	2 *9·4-in.*, 5 *7·5-in.*, 4 *5·9-in.*, 9 *2·8-in.*, 14 M., 2 l.	2 (sub)	22 *t*	1000	628
b.	Tegetthoff Viribus Unitis "No. VII."	20000	495	89½	27	25,000 P. tur. Y.	Trieste . Trieste . Fiume	1912 1911 Bldg.	.. 1913 ..	2,500,000	11–4¾ K.S.	2½	6 K.S.	..	12 K.S.	6 K.S.	12 *12-in.*, 12 *5·9-in.*, 18 *12-pr.*, 6 smaller	4 (sub)	20·7 *t*	900 2000	1000
c.d.s.	Wien .	5550	305	55¾	21	8480	Trieste .	1895	1897	397,850	10½ H.S.	2½ H.S.	3¼ H.S.	8 H.S.	10½ H.S.	3¼ H.S.	4 *9·4-in.*, 6 *5·9-in.*, 12 *1·8-in.*, 6 M., 2 l.	4	17·6 *t*	500	450
b.	Zrinyi .	14226	450¾	80½	26½	20,000 Y.	Trieste .	1910	1911	..	9–7½ K.S.	2	6 K.S.	6 K.S.	10 K.S.	8 K.S.	4 *12-in.*, 8 *9·4-in.*, 20 *3·9-in.*, 6 *12-pr.*, 2 M.	3 sub.	20·5	750 1200	816

Six armoured river monitors, Bodrog, Körös, Leitha, Maros, Szamos, and Temes, of 300–437 tons displacement. Two others are to be built, 1913.

AUSTRIA-HUNGARY.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
to. cr.	Admiral Spaun*	3500	416¾	42	15½	21,000 Y. tur.	Pola	1909	1910	..	1	..	7 *3·9-in.*, 2 M.	2	26·0	450 / 850	320
to. cr.	Aspern	2362	301¾	39½	14¼	7300 Y	Pola	1899	1901	155,000	2	..	8 *4·7-in.*, 8 *1·8-in.*, 4 M.	1	20·0	470 / 500	305
to. cr.	Helgoland*	3500	416¾	42	15½	25,000 Tur.	Monfalcone	1912	..	..	1	..	9 *3·9-in.*, 4 smaller	2	27·0	450 / 850	320
cr. 2nd cl.	Kaiserin Elizabeth	4000	321½	47½	18½	8000	Pola	1890	1892	..	2¼	3½	2 *9·4-in.* (K.), 6 *5·9-in.* do., 13 *1·8-in.*, 4 M., 2 l.	5	19·0	660	418
cr. 2nd cl.	Kaiser Franz Josef I.	3966	321½	47½	18½	8000	Trieste	1889	1891	..	2¼	3½	2 *9·4-in.* (K.), 6 *5·9-in.* do., 16 *1·8-in.*, 2 l.	5	19·0	660	426
to. g. b.	Magnet	502	220	26¾	8	5000 T	Elbing	1896	1899	51,052	..	..	6 *1·8-in.*	3	26·0 *t*	105	80
to. cr.	Novara*	3500	416¾	42	15½	25,000 Tur.	Fiume	1913	..	..	1	..	9 *3·9-in.*, 4 smaller	1	27·0	450 / 850	320
to. cr.	Saida*	3500	416¾	42	15½	25,000 Tur.	Monfalcone	1912	..	..	1	..	9 *3·9-in.*, 4 smaller	1	27·0	450 / 850	320
to. g. b.	Satellit	531	220	26¾	9¼	4000	Elbing	1893	1893	..	1½	..	1 *2·8-in.*, 8 *1·8-in.*	..	21·87	76	84
to. cr.	Szigètvár	2313	301¾	39½	14¼	7800 Y.	Pola	1899	1901	155,000	2	..	8 *4·7-in.*, 8 *1·8-in.*, 4 M.	1	20·0	470 / 500	305
to. g. b.	Trabant	522	220	23	8¼	3500	Trieste	1890	1891	..	..	..	2 *2·8-in.*, 8 *1·8-in.*	1	20·0	..	84
to. cr.	Zenta	2264	301¾	39½	12¼	7300 Y.	Trieste	1897	1899	143,780	2	..	8 *4·7-in.*, 8 *1·8-in.*, 4 M.	1	20·9 *t*	470 / 500	305

* 2¼ in. side armour and 2 in. bulkhead.

Mining vessel, 1000 tons, building. Pelikan, 2431 tons, submarine tender.
Donau, training corvette, launched at Pola, 1893 (2307 tons). A submarine depôt and salvage vessel, 950 tons, 15 knots.
Tender and repair ship for flotillas, Gaea (*ex* Fürst Bismarck).

BRAZIL.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkheads.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in	in.	in.	in.			knots.	tons.	
c.d.s., t.	**Marshal Deodoro**	3112	267½	48	13½	3400 D'A.	La Seyne	1898	1900	..	13¾–4 H.S.	1½	..	..	8 H.S.	3 H.S.	2 *9·4-in.*, 4 *4·7-in.*, 2 M., 4 *6-pr.*, 2 *1-pr.*	2 (sub.)	15·0	236	200
c.d.s., t.	**Marshal Floriano**							1899	1901												
b.	**Minas Geraes**	19,281	500	83	25	27,212 *t* B.&W.	Elswick	1908	1909	1,821,400	9–6–4 K.S.	2	9–6–4 K.S.	9	12–8 K.S.	9 K.S.	12 *12-in.*, 22 *4·7-in.*, 8 *3-pr.*	4	21·4 *t*	900 2400	900
b.	**Rio de Janeiro**	27,500	637	89	27	32,000 B.&W. P. tur.	Elswick	1913	..	..	9–4 K.S.	2–1	6 K.S.	6 K.S.	9 K.S.	6 K.S.	14 *12-in.*, 20 *6-in.*, 10 *12-pr.*	3 (sub.)	22	1500 3000 (oil 500)	1100
b.	**São Paulo**	19,281	500	83	25	28,645 *t* B.&W.	Barrow	1909	1910	1,821,400	9–6–4 K.S.	2	9–6–4 K.S.	9 K.S.	12–8 K.S.	9 K.S.	12 *12-in.*, 22 *4·7-in.*, 8 *3-pr.*	4	21·6 *t*	900 2400	900

Also river monitors Maranhao and Pernambuco, built at Rio de Janeiro. Armoured monitors Javary, Medeira, and Solimões, 1200 tons, building at Barrow.

BRAZIL.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
cr.	Bahia	3100	380	39	13½	17,500 tur.	Elswick	1909	1910	328,500	¾–1½	..	10 *4·7-in.*, 8 *1·8-in.*	2	27·0 t	650	260
"	Barroso	3600	330	43¾	16¾	7500	Elswick	1896	1897	..	3	4½ shields	6 *6-in.*, 4 *4·7-in.*, 10 *6-pr.*, 4 *1-pr.*, 4 M.	3	20·0	700	300
"	Benjamin Constant	2707	236	46	18	2800	La Seyne	1892	1894	..	2	..	4 *6-in.*, 8 *4·7-in.*, 8 M., 4 l.	4	14·0	260	287
to.g.b.	Gustavo Sampaio	500	197	21	7¾	2500	Elswick	1893	1894	..	..	..	2 *20-pr.*, 4 *7-pr.*	3	18·0	150	95
cr.	Republica *	1300	210	35	13	750	Elswick.	1892	1894	..	2–1	..	6 *4·7-in.*, 4 *6-pr.*, 6 M.	4	17·0	170	160
"	Rio Grande do Sul	3100	380	39	13½	17,500 tur.	Elswick	1909	1910	328,500	..	..	10 *4·7-in.*, 8 *1·8*-in.	2	27·4 t	650	260
to.cr.	Tamoyo	1063	269	28¾	9¾	6500	Kiel	1898	1900	..	..	4½ shields	2 *4·1-in.*, 6 *2·2-in.*, 2 *1·4-in.*, 2 M.	3	23·0	293	110
"	Timbira	1014	249½	30¾	10¼	7000	Kiel	1896	1897	..	½	4½ shields	2 *4·1-in.*, 6 *2·2-in.*, 2 *1·4-in.*, 2 M.	3	22·5	250	110
g.v.	Tiradentes	800	165	30	11	1200	Elswick	1892	1893	..	..	..	4 *4·7-in.*, 8 *6-pr.*, 4 M.	2	14·5	110	107
to.cr.	Tupy	1014	249½	30¾	10¼	7000	Kiel	1896	1897	..	½	4½ shields	2 *4·1-in.*, 6 *2·2-in.*, 2 *1·4-in.*, 2 M.	3	22·5	250	110

Eleven screw gunboats, 200 tons to 400 tons, and four 12-knot river gunboats built at Poplar. Two river gunboats built by Messrs. Yarrow were sent out in sections, 1907.

Almirante Tamandare (launched 1890), 4660 tons, gunnery ship.

* Converted into a mine-layer.

CHILE.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			kts.	tons.	
b.	Almirante Latorre	28,000	625	92	$28\frac{1}{2}$	37,000 P.tur.Y	Elswick	Bldg.	..	..	9–6 K.S.	4–12	$4\frac{1}{2}$ K.S.	..	10 K.S.	6 K.S.	10 *14-in.*, 16 *6-in.*, several smaller, 4 M.	4 (sub.)	23	1200 / 4000	1000
	Almirante Cochrane						Walker	Bldg.	..												
a.c.	Almirante O'Higgins shd.	8500	$411\frac{3}{4}$	$62\frac{1}{2}$	22	16,000 B.	Elswick	1897	1898	..	7–5	2	..	..	$7\frac{1}{2}$–6	6	4 *8-in.*, 10 *6-in.*, 4 *4·7-in.*, 10 *12-pr.*, 10 *6-pr.*, 4 M.	3 (2 sub.)	21·5 t	1260	500
b.	Capitão Prat	5981	328	$60\frac{3}{4}$	$21\frac{3}{4}$	12,000	La Seyne	1890	1893	391,000	12	3	4	..	$10\frac{1}{2}$	2	4 *9·4-in.* (Canet), 8 *4·7-in.* (Canet), 10 *12-pr.*, 14 smaller and M.	4	18·3 t	775	480
a.c.	Esmeralda	7020	436	$53\frac{1}{4}$	$22\frac{1}{4}$	16,000	Elswick	1896	1897	..	6 H.S.	2	..	6 H.S.	$4\frac{1}{2}$ Shields	..	2 *8-in.*, 16 *6-in.*, 8 *12-pr.*, 2 *3-pr.*, 4 M.	3 (2 sub.)	22·8 t	1350	500

Capitão Prat reconstructed.

Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						in.	in.			knots.	tons.	
cr	**Blanco Encalada**	4400	370	$46\frac{1}{2}$	$18\frac{1}{2}$	14,500	Elswick	1893	1894	..	$4–1\frac{1}{2}$	..	2 *8-in.*, 10 *6-in.*, 12 *3-pr.*, 10 *1-pr.**	5	22·78 t	900	427
,,	**Chacabuco**	4500	360	46	18	15,750	Elswick	1901	1903	..	$4\frac{1}{2}–1\frac{1}{2}$	..	2 *8-in.*, 10 *4·7-in.*, 16 *1·8-in.*, 2 M., 1 l.	5	23·0	1000	350
,,	**General Baquedano** (Training)	2330	240	$45\frac{3}{4}$	18	1500 B.	Elswick	1898	1900	..	..	..	4 *4·7-in.*, 2 *12-pr.*, 2 *6-pr.*, 2 M., 1 l.	1	13·7 t.	300	302
,,	**Ministro Zenteno**	3600	$330\frac{1}{2}$	$43\frac{3}{4}$	$16\frac{3}{4}$	6500	Elswick	1896	1898	..	..	..	8 *6-in.*, 10 *6-pr.*, 4 *1-pr.**	3	20·0t	800	280
,,	**Presidente Errázuriz**	2047	268	$35\frac{3}{4}$	$19\frac{1}{2}$	5400	La Seyne	1890	1892	..	$3\frac{1}{2}$	..	4 *6-in.* (Canet), 2 *5-in.*, 4 *2·2-in.*, 6 M.	3	19·0	200	171

* Armstrong.

Two Gunboats of 145 tons displacement and one of 180 tons.

CHINA.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						in.	in.			kts.	tons.	
cr.	Chao Hao . . .	2750	330	42	13¼	6000 P. tur.	Elswick .	1911	1912	..	¾	..	2 *6-in.*, 4 *4-in.*, 2 *3-in.*, 6 *3-pr.*, 2 l.	2	22·0	150 / 550	330
cr.	Fei-Hung . .	2600	330	42	13	6500 tur.	Camden, N.J.	1912	..	..	¾	..	2 *6-in.*, 4 *4-in.*, 2 *12-pr.*, 6 *3-pr.*	2	22·0	..	..
to.g.b.	Fei-Ying . . .	837	257¼	28½	12½	4500 Y.	Stettin .	1895	1895	..	..	2	2 *4-in.*, 6 *3·4-in.*, 4 smaller	3	21·8 t	75	90
cr.	Hai-Chi. . . .	4300	396	46¾	18½	17,000	Elswick .	1898	1899	..	5	6	2 *8-in.*, 10 *4·7-in.*, 12 *3-pr.*, 4 *1·4-in.*, 6 M.	5	24·0	300	874
„	Hai-Shen . .							1898	1898								
„	Hai-Shew . .	2903	314¾	41	16	8000	Vulcan . Stettin .	1897	1898	..	3	2	3 *6-in.* (K.), 8 *4-in.*, 6 *1·4-in.* Hotchkiss, 6 M.	3 (1 sub.)	20·7 t	220 / 500	244
„	Hai-Yung . .							1897	1898								
to.cr.	Kien-Wei . .	861	256	26½	10½	7000 N.S.	Foochow	1900	1902	..	..	..	1 *8·9-in.*, 3 *2·5-in.*, 6 *1·4-in.*	2	22·5	360	300
„	Kien-Gnan . .						Foochow	1899	1902	..	..	..					
g.b.	Tchu-Tai . . .	552	..	..	..	..	Kobe . .	1906	1908	..	..	..	2 *4·7-in.*, 2 *12-pr.* . .	..	18·0	..	..
cr.	Ying Swei . . .	2500	330	42	13	6000	Barrow .	1911	1912	..	¾	..	2 *6-in.*, 4 *4-in.*, 2 *3-in.*, 6 *3-pr.*, 2 l.	2	22·0	150 / 550	330

Yung-Fung, Yung-Chiang, Yung Hsiang, 800 tons, 13·5 knots, one 4-in. and smaller guns, Yangtsze gunboats, built in Japan, 1912. Two river gunboats of 150 tons built at the Germania Yard, Kiel. At the Kawasaki Yard, Kobe, the Kiang Heng, Jsu Jang, and other small cruisers, or gunboats, have lately been built. Admiralty yacht Wufung, 500 tons, 14 knots, built at Kiao-chau.

DENMARK.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
c.d.s.,t.	Herluf Trolle .	3415	271	50	16¼	4200 T.	Copenhagen	1899	1901	..	8–4 H.S	2	7 H.S.	..	6 H.S.	6 H.S.	2 *9·4-in.*, 4 *5·9-in.*, 10 *2·2-in.*, 8 smaller.	3 (sub.)	16·0	250	250
b.	Iver Hvitfeldt .	3208	242	49⅓	18	5100	Copenhagen	1886	1889 1900	200,000	12	2	..	9⅓	8	..	2 *10·2-in.* (K.), 10 *6-pr.*, 8 M.	4 (1 sub.)	15·6	250	298
c.d.s.,t.	Olfert Fischer .	3415	271	50	16¼	4200	Copenhagen	1903	1905	..	8–4 K.S.	2	7 K.S.	..	6 K.S.	6	2 *9·4-in.*, 4 *5·9-in.*, 10 *2·2-in.*, 8 smaller.	3 (sub.)	16·0	250	250
c.d.s.,t.	Peder Skram .	3543	274½	51⅓	16¼	4600	Copenhagen	1908	1909	..	8–4 K.S.	2	..	..	7 K.S.	6 K.S.		4	16·5	250	250
c.d.s.,t.	Skjold .	2115	226½	38	13⅓	2200 T.	Copenhagen	1896	1899	..	9	2	..	7	8	4⅓	1 *9·4-in.*, 3 *4·7-in.* (K.), 4 *1·8-in.*, 1 M.	4	13·0	280	210
c.d.s.,t.	Unnamed .	3675	..	..	..	..	Copenhagen	Bldg.	..	..	3–4 K.S.	2	..	..	7 K.S.	6 K.S.	2 *9·4-in.*, 4 *5·9-in.*, 18 smaller	4 (sub.)	16	..	..

DENMARK.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.				tons.	
3rd cl. cr.	Geiser .	1260	257½	27½	11¼	3000 T.	Copenhagen	1892	1893	..	1⅓	..	2 *4·7-in.*, 4 *3·4-in.*, 6 M.	4	17·1 t	125	155
„	Heimdal .	1260	257½	27½	11¼	3000 T.	Copenhagen	1894	1896	..	1⅓	..	2 *4·7-in.*, 4 *3-pr.*, 6 M.	4	17·5	125	155
„	Hekla .	1260	233	32⅔	11¼	3000 T.	Copenhagen	1890	1893	..	1⅓	..	2 *6-in.*, 4 *2·2-in.*, 6 M.	4	17·0	125	155

Two obsolete cruisers, Fyen (2580 tons) and Valkyrien (2854 tons).

FRANCE.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Second-ary.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	**Aube** (Amiral)	9856	453	66¼	24½	22,155 *t.* B.	St. Nazaire	1902	1904	973,440	6–4 H.S.	2	5–2 H.S.	..	7½ H.S.	6½–5 H.S.	2 *7·6-in.*, 8 *6·4-in.*, 6 *3·9-in.*, 20 small Q.F. and M.	2 (sub.)	21·9 *t*	970 / 1590	615
t.	**Bouvet**	12,007	401¼	70¼	27½	14,000 B.	Lorient	1896	1898	1,100,770	15¾–8 H.S.	3½	4 H.S.	..	14½ H.S.	4 H.S.	2 *12-in.*, 2 *10·8-in.*, 8 *5·5-in.*, 8 *3·9-in.*, 19 small Q.F. and M.	2 (sub.)	18·2 *t*	621	621
t.	**Brennus**	11,190	361	67	26¼	14,000 B.	Lorient	1891	1893	991,767	15¾ *comp.*	4	4¾ *comp.*	..	17¾ *comp.*	4¾ *comp.*	3 *13·4-in.*, 10 *6·4-in.*, 23 small Q.F. and M.	4	17·1 *t*	800	696
b.	**Bretagne**	23,600	546	88½	29	28,000 tur.	Brest	1913	..	2,589,439	11–7 K.S.	2¾–1¾	7 K.S.	7 K.S.	10½ K.S.	7 K.S.	10 *13·4-in.*, 22 *5·5-in.*	4 (sub.)	19·0	900 / 2700	1100
a.c.	**Bruix**	4735	365¼	46	19¾	9049 B.	Rochefort	1894	1896	409,622	3¾–2¾	2	3¾	..	3¾	3¾	2 *7·6-in.*, 6 *5·5-in.*, 4 *2·5-in.*, 4 *1·8-in.*, 4 *1·4-in.*, M.	4	18·3 *t*	406	391
t.	**Carnot**	11,954	382¼	70½	27¼	16,300 *t.* D'A.	Toulon	1894	1897	1,070,088	17¾–9 *comp.*	2¾	4	..	14½	4	2 *12-in.*, 2 *10·8-in.*, 8 *5·5-in.*, 4 *2·5-in.*, 16 *1·8-in.*, 10 *1·4-in.*, and M.	2 (sub.)	17·86 *t*	705	625
b.	**Charlemagne**	11,108	385½	66½	27½	14,500 B.	Brest	1895	1898	1,096,432	15¾ H.N.	3½	3 H.N.	..	15¾ H.N.	3 H.N.	4 *12-in.*, 10 *5·5-in.*, 8 *3·9-in.*, 16 *1·8-in.*, 10 *1·4-in.*, 8 M.	2 (sub.)	18·1 *t*	680 / 1100	631
t.	**Charles Martel**	11,693	392½	71	27½	14,996 *t.* D'A.	Brest	1893	1897	1,092,830	17¾	3½	4	..	15¾	4	2 *12-in.*, 2 *10·8-in.*, 8 *5·5-in.*, 4 *2·5-in.*, 14 *1·8-in.*, 5 *1·4-in.*	2 (sub.)	18·1 *t*	677	632
a.c.	**Charner** (Amiral)	4702	348	46	19¼	8300 B.	Rochefort	1893	1895	353,200	3¾–2¾	2	3¾	..	3¾	3¾	2 *7·6-in.*, 6 *5·5-in.*, 14 small Q.F. and M.	4	18·2 *t*	413	375
a.c.	**Condé**	9856	453	63¾	24½	22,175 Nic.	Lorient	1902	1904	863,799	6–4 H.S.	2	5–2 H.S.	..	7½ H.S.	6½–5 H.S.	2 *7·6-in.*, 8 *6·4-in.*, 6 *3·9-in.*, 16 *1·8-in.*, 6 *1·4-in.*	2 (sub.)	21·4 *t*	970 / 1590	615
b.	**Condorcet**	18,028	476	84	27	22,500 N. tur.	St. Nazaire	1909	1911	2,165,200	10–8 K.S.	2¾	8¾	..	12 K.S.	8¾ K.S.	4 *12-in.*, 12 *9·4-in.*, 16 *12 pr.*, 8 *3-pr.*, 2 *1-pr.*	2 (sub.)	19·8 *t*	960 / 2010	690
b.	**Courbet**	23,100	546	88½	29	28,000 N. tur.	Lorient	1911	..	2,508,388	11–7 K.S.	2¾–1¾	7 K.S.	7 K.S.	10½ K.S.	7 K.S.	12 *12-in.*, 22 *5·5-in.*, 4 *3-pr.*	4 (sub.)	20·0	900 / 2700	998
b.	**Danton**	18,028	476	84	27	22,500 B. tur.	Brest	1909	1911	2,068,000	10–8 K.S.	2¾	8¾	..	12 K.S.	8¾ K.S.	4 *12-in.*, 12 *9·4-in.*, 16 *12-pr.*, 8 *3-pr.*, 2 *1-pr.*	2 (sub.)	20·18 *t*	960 / 2010	690
b.	**Démocratie**	14,635	438¾	79½	27½	19,190 B.	Brest	1904	1907	1,473,180	11–7 H.S.	2¾	8 H.S.	..	12 H.S.	6 H.S.	4 *12-in.*, 10 *7·6-in.*, 26 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	19·44 *t*	905 / 1285	793

FRANCE.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour: Belt.	Armour: Deck.	Armour: Side above Belt.	Armour: Bulkhead.	Armour: Gun Position: Heavy Guns.	Armour: Gun Position: Secondary.	Armament: Guns.	Armament: Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	Desaix . shd.	7578	426½	58¼	24¼	17,715 t B.	St. Nazaire	1901	1903	762,759	4–3 H.S.	2¾	..	..	3½ H.S.	..	8 6·4-in., 4 3·9-in., 10 1·8-in., 4 1·4-in.	2	21·7 t	880 / 1200	531
b.	Diderot .	18,028	476	84	27	22,500 N. tur.	St. Nazaire	1909	1911	2,167,000	10–8 K.S.	2¾	8¾	..	12 K.S.	8¾	4 12-in., 12 9·4-in., 16 12-pr., 8 3-pr., 2 1-pr.	2 (sub.)	19·75 t	960 / 2010	690
a.c.	DupetitThouars	9367	452¾	63¾	24½	22,000 t B.	Toulon	1901	1905	831,839	6 H.S.	2	3¾ H.S.	6 H.S.	6 H.S.	3¾ H.S.	2 7·6-in., 8 6·4-in., 4 3·9-in., 16 1·8-in., 6 1·4-in.	2 (sub.)	22·5 t	1020 / 1600	610
a.c.	Dupleix . shd.	7578	426½	58¼	24¼	17,100 B.	Rochefort	1900	1903	652,354	4–3 H.S.	2¾	..	..	3½ H.S.	..	8 6·4-in., 4 3·9-in., 10 1·8-in., 4 1·4-in.	2	21·0	880 / 1200	531
a.c.	Edgard Quinet	13,780	515	70¼	27½	39,803 t B.	Brest	1907	1911	1,307,536	6½–3½ K.S.	2½–1¼	5–2 K.S	4¾ K.S.	8 K.S.	4¾ K.S.	14 7·6-in., 20 2·4-in., 2 smaller.	2 (sub.)	23·9 t	1242 / 2300	738
a.c.	Ernest Renan .	13,427	515	70½	26¾	37,500 Nic., t	St. Nazaire	1906	1909	1,410,000	6¾–4 H.S.	2	5–3 H.S.	4¾	6 H.S.	5 H.S.	4 7·6-in., 12 6·4-in., 16 9-pr., 8 3-pr.	2 (sub.)	25·5 t	1354 / 2300	674
b.	Flandre .	24,800	574¼	88½	28¼	29,200 P.	Brest	Pro.	..	2,589,439	12½–7 K.S.	2¾	7 K.S.	..	12½ K.S.	7 K.S.	12 13·4-in., 24 5·5-in., 4 3-pr.	6 (sub.)	21·0	900 / 2700	1100
b.	France .	23,100	546	88½	29	28,000 N. tur.	St. Nazaire	1912	..	2,603,920	11–7 K.S.	2¾–1¾	7 K.S.	7 K.S.	10½ K.S.	7 K.S.	12 12-in., 22 5·5-in., 4 3-pr.	4 (sub.)	20·0	900 / 2700	998
b.	Gascogne .	24,800	574¼	88½	28¼	29,200 P.	Lorient	Pro.	..	2,589,439	12½–7 K.S.	2¾	7 K.S.	..	12½ K.S.	7 K.S.	12 13·4-in, 24 5·5-in, 4 3-pr.	6 (sub.)	21·0	900 / 2700	1100
b.	Gaulois .	11,105	385½	66½	27½	14,500 B.	Brest	1896	1899	1,093,925	15¾ H.N.	3½–1½	3 H.N.	..	15¾ H.N.	3 H.N.	4 12-in., 10 5·5-in., 8 3·9-in., 16 1·8-in., 10 1·4-in., 8 M.	2 (sub.)	18·0	680 / 1100	632
a.c.	Gloire .	9856	453	63¾	24½	20,500 Nic.	Lorient	1900	1904	883,269	6–4 H.S.	2	5–2 H.S.	..	7½ H.S.	6½–5 H.S.	2 7·6-in., 8 6·4-in., 6 3·9-in., 16 1·8-in., 6 1·4-in.	2 (sub.)	21·0	970 / 1590	615
a.c.	Gueydon . (Amiral)	9367	459	63¾	24½	20,200 Nic.	Lorient	1899	1902	817,994	6–3¾ H.S.	2	3¾ H.S.	6 H.S.	6 H.S.	3¾ H.S.	2 7·6-in., 8 6·4-in., 4 3·9-in., 16 1·8-in., 6 1·4-in.	2 (sub.)	21·0	1020 / 1600	610
t.	Henri IV. .	8807	354½	72	23	11,500 Nic.	Cherbourg	1899	1902	801,248	11–7 H.S.	3	4¾ H.S.	..	11¾ H.S.	5 H.S.	2 10·8-in., 7 5·5-in., 12 1·8-in., 2 M.	2 (sub.)	17·2 t	735 / 1100	464
t.	Jauréguiberry .	11,637	364	72¾	27¾	15,800 D'A.	La Seyne	1893	1896	1,069,536	17¾	2¾	4	..	14½	4	2 12-in., 2 10·8-in., 8 5·5-in., 4 2·5-in., 12 1·8-in., 8 1·4-in., 8 M.	2 (sub.)	18·07 t	700	625

b.	Jean Bart	23,100	546	88½	29	28,000 B. tur.	Brest	1911	..	2,528,888	11–7 K.S.	2¾–1¾	7 K.S.	7 K.S.	10½ K.S.	7 K.S.	12 *12-in.*, 22 *5·5-in*, 4 *3-pr.*	4 (sub.)	20·0	900 2700	998
a.c.	Jeanne d'Arc	11,092	477¼	63¾	26½	28,000 Guyot	Toulon	1899	1903	875,847	6–3 H.S.	2·2	3 H.S.	..	6 H.S.	5 H.S.	2 *7·6-in.*, 14 *5·5-in.*, 16 *1·8-in.*, 8 *1·4-in.*, 2 M.	2 (sub.)	21·7 t	1400 2000	626
,,	Jules Ferry	12,351	480½	70¼	27	28,753 Guyot	Cherbourg	1903	1906	1,169,940	6¾–4 H.S.	2	5–3 H.S.	6	6 H.S.	5 H.S.	4 *7·6-in.*, 16 *6·4-in.*, 22 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	22·8 t	1320 2100	728
,,	Jules Michelet	12,370	480½	70¼	27	27,700 Guyot	Lorient	1905	1908	1,204,107	6–4 K.S.	2	5–3 K.S.	6 H.S.	8 K.S.	5 K.S.	4 *7·6-in.*, 12 *6·4-in.*, 24 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	23·2 t	1320 2100	724
b.	Justice	14,635	438¾	79½	27½	18,548 Nic. t.	La Seyne	1904	1907	1,670,385	11–7 H.S.	2¾	8 H.S.	..	12 H.S.	6 H.S.	4 *12-in.*, 10 *7·6-in.*, 26 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	19·43 t	905 1825	793
a.c.	Kléber . shd.	7578	426½	58¼	24¼	18,000 Nic.	Bordeaux	1902	1904	770,320	4–3 H.S.	2¾	..	..	3½ H.S.	..	8 *6·4-in.*, 4 *3·9-in.*, 10 *1·8-in.*, 4 *1·4-in.*	2	21·2 t	880 1200	531
b.	Languedoc	24,800	574¼	88½	28¼	29,200 P.	La Seyne	Pro.	..	2,642,439	12½–7 K.S.	2¾	7 K.S.	..	12½ K.S.	7 K.S.	12 *13·4-in.*, 24 *5·5-in.*, 4 *3-pr.*	6 (sub.)	21·0	900 2700	1100
a.c.	Léon Gambetta	12,351	480½	70¼	27	27,500 Nic.	Brest	1901	1904	1,169,940	6¾–4 H.S.	2	5–3 H.S.	6	8 H.S.	5 H.S.	4 *7·6-in.*, 16 *6·4-in.*, 22 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	23·06 K.	1320 2100	728
b.	Lorraine	23,600	546	88½	29	28,000 tur.	St. Nazaire	Bldg.	..	2,642,439	11–7 K.S.	2¾–1¾	7 K.S.	7 K.S.	10½ K.S.	7 K.S.	10 *13·4-in.*, 22 *5·5-in.*	4 (sub.)	19·0	900 2700	1100
a.c.	Marseillaise	9856	453	63¾	24½	20,500 B.	Brest	1900	1903	881,270	6·4 H.S.	2	5–2 H.S.	..	7½ H.S.	6½–5 H.S.	2 *7·6-in.*, 8 *6·4-in.*, 6 *3·9-in.*, 2 *2·5-in.*, 18 *1·8-in.*, 6 *1·4-in.*	2 (sub.)	21·0	970 1590	615
t.	Masséna	11,735	384¾	66	27	13,500 D'A.	St. Nazaire	1895	1898	1,100,400	17¾–9¾	3½	4 H.S.	16	15¾ 15¾ H. S.	4	2 *12-in.*, 2 *10·8-in.*, 8 *5·5-in.*, 8 *3·9-in.*, 12 *1·8-in.*, 12 *1·4-in.*	2 (sub.)	17·1 t	630	642
b.	Mirabeau	18,028	476	84	27	22,500 B. tur.	Lorient	1909	1911	2,032,000	10–8 K.S.	2¾	8¾	..	12 K.S.	8¾ K.S.	4 *12-in.*, 12 *9·4-in.*, 16 *12-pr.*, 8 *3-pr.*, 2 *1-pr.*	2 (sub.)	19·73 t	960 2010	690
a.c.	Montcalm	9367	452¾	63¾	24½	19,600 N.S.	La Seyne	1900	1902	902,809	6 H.S.	2	3¾ H.S.	6 H.S.	6 H.S.	2¾ H.S.	2 *7·6-in.*, 8 *6·4-in.*, 4 *3·9-in.*, 16 *1·8-in.*, 6 *1·4-in.*	2 (sub.)	21·0	1020 1600	612
b.	Normandie	24,800	574¼	88½	28¼	29,200 P.	St. Nazaire	Pro.	..	2,642,439	12½–7 K.S.	2¾	7 K.S.	..	12½ K.S.	7 K.S.	12 *13·4-in.*, 24 *5·5-in.*, 4 *3-pr.*	6 (sub.)	21·0	900 2700	1100
b.	Paris	23,100	546	88½	29	28,000 N. tur.	La Seyne	1912	..	2,603,920	11–7 K.S.	2¾–1¾	7 K.S.	7 K.S.	10½ K.S.	7 K.S.	12 *12-in.*, 22 *5·5-in.*, 4 *3-pr.*	4 (sub.)	20·0	900 2700	998

FRANCE.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			kts.	tons.	
b.	**Patrie**	14,635	438¾	79½	27½	17,859 *t.*Nic.	La Seyne	1903	1906	1,674,870	11–7 H.S.	2¾	8 H.S.	..	12 H.S.	6 H.S.	4 *12-in.*, 18 *6·4-in.*, 26 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	19·12 *t*	905 1825	793
b.	**Provence**	23,600	546	88½	29	28,000 tur.	Lorient	1913	..	2,600,195	11–7 K.S.	2¾–1¾	7 K.S.	7 K.S.	10½ K.S.	7 K.S.	10 *13·4-in.*, 22 *5·5-in.*	4 (sub.)	19·0	900 2700	1100
b.	**République**	14,635	438¾	79½	27½	19,626 *t.*Nic.	Brest	1902	1906	1,523,136	11–7 H.S.	2¾	8 H.S.	..	12 H.S.	6 H.S.	4 *12-in.*, 18 *6·4-in.*, 26 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	19·15	905 1825	793
b.	**Saint Louis**	11,090	385½	66½	27½	14,500 B.	Lorient	1896	1900	1,080,997	15¾ H.N.	3½	3 H.N.	..	3–15¾ H.N.	3 H.N.	4 *12-in.*, 10 *5·5-in.*, 8 *3·9-in.*, 16 *1·8-in.*, 10 *1·4-in.*, 8 M.	2 (sub.)	18·0	820 1150	631
t.	**Suffren**	12,527	411¾	70¼	27½	16,500 Nic.	Brest	1899	1903	1,195,564	12–8 H.S.	2¾	5–3 H.S.	..	12 H.S.	6–5 H.S.	4 *12-in.*, 10 *6·4-in.*, 8 *3·9-in.*, 20 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	18·0	1100 1820	615
b.	**Vergniaud**	18,028	476	84	27	22,500 N. tur.	Bordeaux	1910	1911	2,165,200	10–8 K.S	2¾	8¾	..	12 K.S.	8¾ K.S.	4 *12-in.*, 12 *9·4-in.*, 16 *12-pr.*, 8 *3-pr.*, 2 *1-pr.*	2 (sub.)	19·67 *t*	960 2010	690
b.	**Vérité**	14,635	438¾	79½	27½	20,433 *t.* B.	Bordeaux	1907	1908	1,661,409	11–7 H.S.	2¾	8 H.S.	..	12 H.S.	6 H.S.	4 *12-in.*, 10 *7·6-in.*, 26 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	19·26 *t*	905 1825	822
a.c.	**Victor Hugo**	12,351	480½	70¼	27	28,486 *t.* B.	Lorient	1904	1907	1,229,932	6¾–4 H.S.	2	5–3 H.S.	6	8 H.S.	5 H.S.	4 *7·6-in.*, 16 *6·4-in.*, 22 *1·8-*, 2 *1·4-in.*	2 (sub.)	22·5 *t*	1320 2100	728
b.	**Voltaire**	18,028	476	84	27	22,500 B. tur.	La Seyne	1909	1911	2,169,200	10–8 K.S.	2¾	8¾	..	12 K.S.	8¾ K.S.	4 *12-in.*, 12 *9·4-in.*, 16 *12-pr.*, 8 *3-pr.*, 2 *1-pr.*	2 (sub.)	20·66 *t*	960 2010	690
a.c.	**Waldeck-Rousseau**	13,780	515	70¼	27½	36,110 Nic. *t.*	Lorient	1908	1911	1,301,380	6½–3½	2½	5	4¾	6	5½	14 *7·6-in.*, 20 *2·4-in.*, 2 *1-pr.*	2 (sub.)	23·10 *t*	1242 2300	738

Pothuau, 5374 tons, gunnery training ship; Latouche-Tréville, 4681 tons, tender to gunnery ship.

FRANCE.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
3rd cl. *cr.*	**Cassard** . . .	3890	325½	45	20½	10,143 D'A.	Cherbourg .	1896	1898	318,712	3	2 shield	6 *6·4-in.*, 4 *3·9-in.*, 10 *1·8-in.*, 3 *1·4-in.*, 2 M.	2	19·8 *t*	630	385
2nd cl. *cr.*	**Châteaurenault** shd.	7898	442¾	55¾	24½	24,300 *t.* N.S.	La Seyne .	1898	1902	606,656	2½	2 shield	2 *6·4-in.*, 6 *5·5-in.*, 10 *1·8-in.*	2	24·19 *t*	1400 / 2100	625
g. v. .	**Décidée** . . .	635	184¾	26¼	12¼	1000 Nic.	Lorient . .	1899	1900	54,100	..	..	2 *3·9-in.*, 4 *2·5-in.*, 4 *1·4-in.*	..	13·0	99	99
2nd cl. *cr.*	**D'Entrecasteaux** shd.	7995	383½	58½	25¾	13,500	La Seyne .	1896	1898	667,740	4	10–3 H.S.	2 *9·4-in.*, 12 *5·5-in.*, 12 *1·8-in.*	2	19·2 *t*	650	521
3rd cl. *cr.*	**Descartes** . shd.	3970	326	42¼	21¾	9000 B.	St. Nazaire .	1894	1896	334,725	1½	..	4 *6·4-in.*, 10 *3·9-in.*, 8 *1·8-in.*, 4 *1·4-in.*	2	21·0 *t*	552	386
,, ,,	**D'Estrées** . shd.	2421	311¾	39¼	17¾	8500 Nor.	Rochefort .	1897	1900	208,200	1½	..	2 *5·5-in.*, 4 *3·9-in.*, 8 *1·8-in.*, 2 *1·4-in.*	..	20·5 *t*	345 / 480	234
,, ,,	**Du Chayla** . shd.	3890	325½	45	20½	10,009 D'A.	Cherbourg .	1895	1897	315,835	3	2 shield	6 *6·4-in.*, 4 *3·9-in.*, 10 *1·8-in.*, 3 *1·4-in.*, 2 M.	2	20·2 *t*	624	385
to. g. b. .	**Dunois** . . .	889	256	27¾	12¾	7000 N.S.	Cherbourg .	1897	1898	123,383	..	..	6 *2·5-in.*, 6 *1·8-in.* . .	..	23·0	137	128
T.D.S. .	**Foudre** . . .	5984	370½	52½	23½	11,900 *t.* D'A.	Bordeaux .	1895	1897	407,712	3½	..	8 *3·9-in.*, 4 *2·5-in.*, 4 *1·4-in.*	4	19·9 *t*	840	410

FRANCE.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
3rd cl. *cr.*	**Friant** . . .	3882	308½	43½	20¾	9000 Nic.	Brest . .	1893	1895	308,750	3	..	6 *6·4-in.*, 4 *3·9-in.*, 8 *1·8-in.*, 6 *1·4-in.*	2	18·19	587	358
2nd cl. *cr.*	**Guichen** . . shd.	8151	436¼	54¾	24½	24,000 D'A.	St. Nazaire .	1897	1899	611,945	2½	2 shield	2 *6·4-in.*, 6 *5·5-in.*, 10 *1·8-in.*	2	23·0	1460	625
" "	**Jurien de la Gravière** shd.	5595	440	43½	22	17,000 Guyot	Lorient . .	1899	1901	475,979	3	..	8 *6·4-in.*, 12 *1·8-in.* . .	2	22·9 *t*	600 / 900	511
g. v. .	**Kersaint** . . shd.	1223	226	34½	15	2200	Rochefort .	1897	1898	107,933	..	..	1 *5·5-in.*, 5 *3·9-in.*, 7 *1·4-in.*	..	15·0	199	110
to. g. b.	**La Hire** . . .	889	256	27¾	12¾	7000 N.S.	Cherbourg .	1898	1899	123,383	..	..	6 *2·5-in.*, 6 *1·8-in.* . .	..	23·0	137	128
3rd cl. *cr.*	**Lavoisier** . .	2285	330¼	34½	17¾	6400 B.	Rochefort .	1897	1899	202,024	1½	2 shield	4 *5·5-in.*, 2 *3·9-in.*, 8 *1·8-in.*, 2 *1·4-in.*, 4 M.	2	20·0	226	248
g. v. .	**Surprise** . .	617	184¾	24½	12¼	853 *t.*	Havre . .	1895	1896	50,954	..	..	2 *3·9-in.*, 4 *2·5-in.*, 4 *1.4-in.*	..	13·4 *t*	73	99
g. v. .	**Zélée** . . .	554	185½ [illegible]	26	10½	1000 Nic.	Rochefort .	1899	1900	..	..	..	2 *3·9-in.*, 4 *2·5-in.*, 4 *1·4-in.*	..	13·0	80	75

In addition are the cruisers Cosmao, Forbin and Surcouf, 1950 tons (1888–9), and several gun vessels and river gunboats.

Mine-layers Pluton and Cerbère, 560 tons, 6000 I.H.P., 20 knots, in course of construction. Converted mining vessels, 966 tons; Casabianca, 974 tons. Gunboat Balny, 214 tons, in hand; another provided for.

Merchant Auxiliary Cruisers.—The Touraine, 8429 register tons, 19·5 knots, Lorraine, 11,869 register tons, 21 knots, Savoie, 11,200 register tons, 22½ knots, and Provence, 13,750 register tons, 22 knots, of the Compagnie Générale Transatlantique, are, under contract, auxiliary cruisers of the Navy in case of war, as well as some other vessels, and the Amazone. Magellan, Tonkin, Touraine, and other 17 and 17½ knot boats of the Messageries Maritimes.

GERMANY.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Secondary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a. c.	Blücher	15,550	499	80¼	..	40,000 t.	Kiel	1908	1910	1,250,000	6 K.S.	..	6 K.S.	..	6 K.S.	6 K.S.	12 8·2-in., 8 5·9-in., 16 3·4-in.	4	25·3 t	900 / 2300	887
b.	Brandenburg	9874	354¼	65	24½	9640	Stettin (Vulcan)	1891	1893	606,500‡	15¾ comp.	2½	..	..	11¾ comp.	1½	6 11-in., 8 4·1-in., 8 3·4-in., 12 1·4-in., 8 M., 21.	3 (2 sub.)	16·5 t	680 / 800	552
b.	Brandenburg (Ersatz)*	27,000	..	..	..	..	Kiel (Germania)	Bldg.	..	..	..	..	..	..	..	..	..	..	..	..	..
b.	Braunschweig	12,997	398½	73½	24½	16,000 T.S. & C.	Germania	1902	1904	1,157,500	9–4 K.S.	3	6 K.S.	6 K.S.	10–6 K.S.	6 K.S.	4 11-in., 14 6·7-in., 18 3·4-in., 4 M.	6 (sub.)	18·0	700 / 1600†	660
b.	Deutschland	13,040	398½	72¾	24½	16,939 T.S. & C.	Germania	1904	1906	1,214,000	9½–4 K.S.	3	8 K.S.	6 K.S.	10–6 K.S.	6¾ K.S.	4 11-in., 14 6·7-in., 22 3·4-in., 4 1·4-in., 4 M.	6 (sub.)	18·5 t	700 / 1800†	736
b.	Elsass	12,997	398½	72¾	24½	16,812 W.T. & C.	Danzig (Schichau)	1903	1905	1,157,500	9–4 K.S.	3	6 K.S.	6 K.S.	10–6 K.S.	6 K.S.	4 11-in., 14 6·7-in., 18 3·4-in., 4 M.	6 (sub.)	18·7	800 / 1600†	660
b.	Friedrich der Grosse	24,310	564¼	95¼	27¼	25,000 (tur.)	Hamburg (Vulcan)	1911	1912	..	12½–5 K.S.	3	7 K.S.	..	12 K.S.	7 K.S.	10 12-in., 14 5·9-in., 12 3·4-in.	5	21·0	1000 / 3600	1073
a. c.	Friedrich Karl	8858	393½	65½	24	18,500 Dürr.	Hamburg (Blohm & Voss)	1902	1904	875,000	4 K.S.	2	6 K.S.	4 K.S.	6 K.S.	4 K.S.	4 8·2-in., 10 5·9-in., 12 3·4-in., 14 1·4-in., 4 M.	4 (sub.)	20·5 t	950 / 1500†	504
"	Fürst Bismarck	10,570	393½	66½	26	14,000 Dürr.	Kiel	1897	1900	..	7¾ K.S.	3	..	..	7¾ K.S.	..	4 9·4-in., 12 5·9-in., 10 3·4-in., 10 1·4-in., 8 M.	6 (5 sub.)	19·0	1000†	565
"	Gneisenau	11,420	449½	70¾	24½	26,000 T.S.	Bremen (Weser)	1906	1908	..	6–3 K.S.	2	6–4¾	..	6¾	..	8 8·2-in., 6 5·9-in., 20 3·4-in., 14 smaller.	4 (sub.)	23·8 t	800† / 2000	650
b. cr.	Goeben	22,600	610¼	96	27	70,000 tur.	Hamburg (Blohm & Voss)	1911	..	..	7½–4 K.S.	..	..	..	8 K.S.	5 K.S.	10 11-in., 12 5·9-in., 12 3·4-in.	4	28·6 t	1000 / 3100	1013
b.	Hannover	13,040	398½	73¾	25¼	22,492 T.S. t.	Wilhelmshaven	1905	1907	1,157,500	9½–4 K.S.	3	8 K.S.	6 K.S.	10–6 K.S.	6¾ K.S.	4 11-in., 14 6·7-in., 20 3·4-in., 4 1·4-in., 4 M.	6 (sub.)	19·16 t	700 / 1800†	736
b.	Helgoland	22,500	546	93½	26½	28,000	Kiel (Howaldt)	1909	1911	..	10½–4 K.S.	..	..	..	11 K.S.	6 K.S.	12 12-in., 14 5·9-in., 14 3·4-in.	6 (sub.)	20·5	900 / 3000	1107
b.	Hessen	12,997	398½	73¾	24½	16,000 T.S. & C.	Kiel (Germania)	1903	1905	1,157,500	9–4 K.S.	3	6 K.S.	6 K.S.	10–6 K.S.	6 K.S.	4 11-in., 14 6·7-in., 18 3·4-in., 4 M.	6 (sub.)	18·0	800 / 1600†	660
b. cr.	"K"*	30,000	610	96	27	100,000	Hamburg (Blohm & Voss)	Bldg.	..	..	7 K.S.	..	..	..	10 K.S.	..	10 11-in., 12 5·9-in., 12 3·4-in.	4	27·0	..	..
b.	Kaiser	24,310	564¼	95¼	27¼	25,000 (tur.)	Kiel	1911	1912	..	12½–5 K.S.	3	7 K.S.	..	12 K.S.	7 K.S.	10 12-in., 14 5·9-in., 12 3·4-in.	5 (sub.)	23·6 t	1000 / 3600	1073

* Particulars doubtful, or not known. † Also liquid fuel. ‡ Exclusive of armament.

GERMANY.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			kts.	tons.	
b.	Kaiser Barbarossa					13,000 C.&T.	Danzig	1900	1901 1907	962,500	11¾ H. N. S.	3	..	..	9¾ H. N. S.	6 H.N.S.	4 *9·4-in.*, 14 *5·9-in.*, 12 *3·4-in.*, 12 *1·4-in.*, 8 M.	5 (sub.)	16·0	650 / 1050†	700
b.	Kaiser Friedrich III.					13,000 C.&T.	Wilhelmshaven	1896	1899												
b.	Kaiser Wilhelm II.	10,974	377¼	66¾	25½	13,000 C.&T.S.	Wilhelmshaven	1897	1900	962,500	11¾ H. N. S.	3	..	..	9¾ H. N. S.	6 H.N.S.	4 *9·4-in.*, 18 *5·9-in.*, 12 *3·4-in.*, 12 *1·4-in.*, 8 M.	5 (sub.)	18·0	650 / 1050†	700
b.	Kaiser Wilhelm der Grosse					13,000 C.&T.S.	Germania	1899	1901												
b.	Kaiser Karl der Grosse					13,000 C.&T.S.	Hamburg (Blohm & Voss)	1899	1901												
b.	Kaiserin	24,310	564¼	95¼	27¼	25,000 (tur.)	Kiel (Howaldt)	1911	..	..	12½–5 K.S.	3	7 K.S.	..	12 K.S.	7 K.S.	10 *12-in.*, 14 *5·9-in.*, 12 *3·4-in.*	5 (sub.)	21·0	1000 / 3600	1073
b. cr.	Kaiserin Augusta*	..	..	..	..	..	Danzig (Schichau)	Bldg.	..	..	..	..	..	..	..	..	..	..	..	..	..
b.	Konig*	..	..	..	..	.. T.S.	Wilhelmshaven	1913	..	..	..	..	..	..	..	..	10 *14-in.*, 14 *5·9-in.*	..	..	..	..
b.	König Albert	24,310	564¼	95¼	27¼	25,000 (tur.)	Danzig (Schichau)	1912	..	..	12½–5 K.S.	3	7 K.S.	..	12 K.S.	7 K.S.	10 *12-in.*, 14 *5·9-in.*, 12 *3·4-in.*	5 (sub.)	21·0	1000 / 3600	1073
b.	Kurfürst Friedrich Wilhelm (Ersatz)*	..	..	..	..	.. T.S.	Hamburg (Vulcan)	..	..	..	..	..	..	..	..	..	10 *14-in.*, 14 *5·9-in.*	..	..	..	..
b.	Lothringen	12,997	398½	73¾	24½	16,950 W.T.&C.	Schichau (Danzig)	1904	1906	1,157,500	9–4 K. S.	3	6 K. S.	6 K.S.	10–6 K. S.	6 K. S.	4 *11-in.*, 14 *6·7-in.*, 18 *3·4-in.*, 4 M.	6 (sub.)	18·54 *t*	800 / 1600†	600
b.	Mecklenburg	11,643	393¾	68¼	24¾	14,000 C.T. & S.	Stettin (Vulcan)	1901	1903	1,061,250	9–4 K.S.	3	5½ K.S.	6 K.S.	10 K.S.	6 K.S.	4 *9·4-in.*, 18 *5·9-in.*, 12 *3·4-in.*, 12 *1·4-in.*, 8 M.	6 (sub.)	18·1 *t*	700 / 1450†	715
b. cr.	Moltke	22,600	610¼	96	27	86,900*t* (P. tur.)	Hamburg (Blohm & Voss)	1910	1911	..	7½–4 K.S.	..	..	..	8 K.S.	5 K.S.	10 *11-in.*, 12 *5·9-in.*, 12 *3·4-in.*	4 (sub.)	28·4 *t*	1000 / 3100	1013
b.	Nassau	18,200	452	89	26½	20,000	Wilhelmshaven	1908	1909	1,825,000	10–4 K.S.	..	..	..	12 K.S.	..	12 *11-in.*, 12 *5·9-in.*, 16 *3·4-in.*	6 (sub.)	20·7 *t*	950 / 2700	961
b.	Oldenburg	22,500	546	93½	26½	28,000	Danzig (Schichau)	1910	1912												
b.	Ostfriesland	22,500	546	93½	26½	28,000	Wilhelmshaven	1909	1911	..	10½–4 K.S.	..	..	..	11 K.S.	6 K.S.	12 *12-in.*, 14 *5·9-in.*, 14 *3·4-in.*	6 (sub.)	22·2 *t*	900 / 3000	1107

b.	Pommern	13,040	398½	72¾	25¼	20,400 T.S. *t.*	Stettin (Vulcan)	1905	1907	1,214,000	9½–4 K.S.	3	8 K.S.	6 K.S.	10–6 K.S.	6¾ K.S.	4 *11-in.*, 14 *6·7-in.*, 20 *3·4-in.*, 4 *1·4-in.*, 4 M.	6 (sub.)	19·21 *t*	700 1800†	736
b.	Posen	18,200	452	89	26½	20,000	Kiel (Germania)	1908	1910	1,825,000	10–4 K.S.	..	..	..	12 K.S.	..	12 *11-in.*, 12 *5·9 in.*, 16 *3·4-in.*	6	20·5	950 2700	961
b.	Preussen	12,997	389½	73¾	24¼	18,374 W.T.& C.	Stettin	1903	1905	1,157,500	9–4 K.S.	3	6 K.S.	6 K.S.	10–6 K.S.	6 K.S.	4 *11-in.*, 14 *16·7-in.*, 12 *3·4-in.*, 12 *1·4-in.* & 8 M.	6 (5sub.)	18·6 *t*	800 1600†	660
a. c.	Prinz Adalbert	8858	393½	65½	24	18,500 Dürr.	Kiel	1901	1903	885,000	4 K.S.	1½	3 K.S.	3 K.S.	6 K.S.	4 K.S.	4 *8·2-in.*, 10 *5·9-in.*, 12 *3·4-in.*, 14 *1·4-in.*, 4 M.	4 (3sub.)	20·3	950 1500†	504
a. c.	Prinz Heinrich	8759	396	64¼	25¼	15,000 Durr.	Kiel	1900	1902	730,000	4 K.S.	2½	4 K.S.	..	6 K.S.	4 K.S.	2 *9·4-in.*, 10 *5·9-in.*, 10 *3·4-in.*, 10 *1·4-in.*, 4 M.	4 (3sub.)	20·0	950	528
b.	Prinz-Regent Luitpold	24,310	564¼	95¼	27¼	25,000 (tur.)	Kiel (Germania)	1912	..	..	12½–5 K.S.	3	7 K.S.	..	12 K.S.	5 K.S.	10 *12-in.*, 14 *5·9-in.*, 12 *3·4-in.*	..	21·0	1000 3600	1073
b.	Rheinland	18,200	452	89	26½	20,000	Stettin (Vulcan)	1908	1910	1,825,000	10–4 K.S.	..	..	..	12 K.S.	..	12 *11-in.*, 12 *5·9-in.*, 16 *3·4-in.*	6	20·0	950 2700	961
a. c.	Roon	9350	403¼	65½	24	20,625 Dürr.	Kiel	1903	1905	875,000	4–3 K.S.	2¾	6 K.S.	4 K.S.	6 K.S.	4 K.S.	4 *8·2-in.*, 10 *5·9-in.*, 16 *3·4-in.*, 10 *1·4-in.*, 4 M.	4 (sub.)	21·17	750 1800†	50
a. c.	Scharnhorst	11,420	449½	70¾	24½	26,000 T.S.	Hamburg (Blohm&Voss)	1906	1908	..	6–3 K.S.	2	6–4¾	..	6¾	..	8 *8·2-in.*, 6 *5·9-in.*, 20 *3·4-in.*, 14 smaller	4	22·5	800† 2000	650
b.	Schlesien	13,040	398½	72¾	25¼	16,939 T.S. & C.	Schichau	1906	1908	1,214,000	9½–4 K.S.	3	8 K.S.	6 K.S.	11–6 K.S.	6¾ K.S.	4 *11-in.*, 14 *6·7-in.*, 20 *3·4-in.*, 4 *1·4*, 4 M.	6 (sub.)	19·2	700 1800†	736
b.	Schleswig-Holstein						Germania												19·5 *t*		
b.	Schwaben	11,643	393¾	68¼	24¾	14,000 C.&T.S.	Wilhelmshaven	1901	1903	1,061,250	9–4 K.S.	3	5½ K.S.	6 K.S.	10–6 K.S.	6 K.S.	4 *9·4-in.*, 18 *5·9-in.*, 12 *3·4-in.*, 12 *1·4-in.*, 8 M.	6 (5sub.)	18·0	700 1450†	715
b. cr.	Seydlitz *	24,000	610	96	27	50,000	Hamburg (Blohm&Voss)	1912	..	..	7 K.S.	..	..	..	10 K.S.	..	10 *11-in.*, 12 *5·9-in.*, 12 *3·4-in.*	4	27·0	..	..
b.	Thüringen	22,500	546	93½	26½	34,000 *t.* (tur.)	Bremen (Weser)	1909	1911	..	10½–4 K.S.	..	..	..	11 K.S.	6 K.S.	12 *12-in.*, 14 *5·9-in.*, 14 *3·4-in.*	6	21·07 *t*	900 3000	1107
b. cr.	Von der Tann	18,700	561	87	26½	71,500 *t.* (P.tur.)	Hamburg (Blohm&Voss)	1909	1911	1,833,000	6 K.S.	..	..	..	..	6 K.S.	8 *11-in.*, 10 *5·9-in.*, 16 *3·4-in.*	4	27·6 *t*	1000 2800	910
b.	Weissenburg (Ersatz)*	..	..	..	..	.. T.S.	Bremen (Weser)	..	..	..	..	..	..	..	..	..	10 *14-in.*, 14 *5·9-in.*	..	..	..	..
b.	Westfalen	18,200	452	89	26½	26,792 (*t.*)	Bremen (Weser)	1908	1909	1,825,000	10–4	..	..	..	12	..	12 *11-in.*, 12 *5·9-in.*, 16 *3·4-in.*	6	20·2 *t*	950 2700	961
b.	Wettin	11,643	393¾	68¼	24¾	14,000 C.&T.S.	Schichau	1901	1902	1,071,250	9–4 K.S.	3	5½ K.S.	6 K.S.	10 K.S.	6 K.S.	4 *9·4-in.*, 18 *5·9-in.*, 12 *3·4-in.*, 12 *1·4-in.*, 8 M.	6 (sub.)	18·0	700 1450†	715
b.	Wittelsbach						Wilhelmshaven	1900	1902	1,071,250											
b.	Wörth	9874	354¼	65	24½	10,224 (*t.*)	Kiel	1892	1894	595,250‡	15¾	2½	..	..	11¾	1½	6 *11-in.*, 8 *4·1-in.*, 8 *3·4-in.*, 12 *1·4-in.*, 8 M., 2 l.	3 (2sub.)	17·2	680 800	552
a. c.	Yorck	9350	403¼	65½	24	19,183 Dürr.	Hamburg (Blohm&Voss)	1904	1905	875,000	4–3 K.S.	2	6 K.S.	4 K.S.	6 K.S.	4 K.S.	4 *8·2-in.*, 10 *5·9-in.*, 16 *3·4-in.*, 10 *1·4-in.*, 4 M.	4 (sub.)	21·1 *t*	750 1600†	550
b.	Zähringen	11,643	393¾	68¼	24¾	15,000 C.&T.S.	Kiel (Germania)	1901	1902	1,071,250	9–4 K.S.	3	5½ K.S.	6 K.S.	10 K.S.	6 K.S.	4 *9·4-in.*, 18 *5·9-in.*, 12 *3·4-in.*, 12 *1·4-in.*, 8 M.	6 (sub.)	19·0	650 1000†	715

* Particulars doubtful or not known. † Also liquid fuel. ‡ Exclusive of armament.

The programme for 1913 includes a battleship to replace the Wörth and one additional, designated T, also a battle-cruiser nominally to replace the protected cruiser Hertha.

GERMANY.—Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
3rd cl. *cr.*	Amazone . . shd.	2618	328	38½	16	8000 T.S.	Kiel (Germania) .	1900	1901	247,000	2	..	10 *4·1-in.*, 14 M. . .	2 (sub.)	21·5 *t*	560	249
,, ,,	Arcona . . shd.	2657	328	38½	16	8000 T.S.	Bremen (Weser) .	1902	1903	254,500	2	..	10 *4·1-in.*, 14 M. . .	2 (sub.)	21·0	700	249
,, ,,	Ariadne . . shd.	2618	328	38½	16	8000 T.S.	Bremen (Weser) .	1900	1901	247,000	2	..	10 *4·1-in.*, 14 M. . .	2 (sub.)	22·0	560	249
,, ,,	Augsburg . . .	4280	401¾	46	16½	20,000 (tur.)	Kiel . . .	1909	1910	..	2	..	12 *4·1-in.*, 4 *2·1-in.*, 4 M.	2 (sub.)	27·0	400 / 900	363
,, ,,	Berlin. . . shd.	3200	341	43¼	16½	11,000 T.S.	Danzig . .	1903	1905	254,500	2	..	10 *4·1-in.*, 14 M. . .	2 (sub.)	23·2 *t*	800	286
,, ,,	Bremen . . .	3200	341	43¼	16½	10,000 T.S.	Bremen (Weser) .	1903	1904	254,500	2	..	10 *4·1-in.*, 14 M. . .	2 (sub.)	23·0	800	286
,, ,,	Breslau . . .	4500	446¼	44½	16¾	25,000 A.E.G.t.	Stettin (Vulcan) .	1911	1912	..	2	(4–2½ side)	12 *4·1-in.*, 2 M. . .	2 (sub.)	27·5 *t*	1200	370
,, ,,	Danzig . . .	3200	341	43¼	16½	10,000 T.S.	Danzig . . .	1905	1907	254,500	2	..	10 *4·1-in.*, 14 M. . .	2 (sub.)	23·0	800	286
,, ,,	Dresden . . .	3544	364	44¼	15¾	15,000 (tur.)	Hamburg . .	1907	1908	..	2	..	12 *4·1-in.*, 4 *2·1-in.*, 4 M.	2 (sub.)	27·0	400 / 850	348
g.b. .	Eber	977	206¾	30¼	10¾	1300 T.S.	Danzig . . .	1903	1904	91,000	..	..	8 *3·4-in.*, 6 *1·4-in.*, 2 M.	..	13·0	240	121
3rd cl. *cr.*	Emden . . .	3544	364	44¼	15¾	15,000 (tur.)	Danzig . .	1908	1909	..	2	..	10 *4·1-in.*, 4 *2·1-in.*, 4 M.	2 (sub.)	25·0	400 / 850	320
,, ,,	Frauenlob . . shd.	2657	328	38½	16	8000 T.S.	Bremen (Weser) .	1902	1904	254,500	2	..	10 *4·1-in.*, 14 M. . .	2 (sub.)	21·0	700	249
2nd cl. *cr.*	Freya	5569	344½	57	20¾	10,000 Nic.	Danzig . . .	1897	1898	..	4 N.S.	4 N.S.	2 *8·2-in.*, 6 *5·9-in.*, 14 *3·4-in.*, 4 M.	3 (sub.)	19·5 *t*	825	465
3rd cl. *cr.*	Gazelle . . shd.	2603	328	38½	16¾	6400 Nic.	Kiel (Germania) .	1898	1898	225,000	2	..	10 *4·1-in.*, 14 M. . .	3 (1 sub.)	18·0	560	210
,, ,,	Gefion . . .	3705	344½	42¾	20¾	9000	Danzig (Schichau) .	1893	1894	..	1¼	..	10 *4·1-in.*, 6 *2·1-in.*, 4 M.	2	19·0	780	302
,, ,,	Geier . . shd.	1597	249¼	34¾	15½	2960	Wilhelmshaven .	1894	1896	..	3	..	8 *4·1-in.*, 7 M. . .	..	16·2 *t*	300	165
3rd cl. *cr.*	Hamburg . . shd.	3200	341	43¼	16½	11,500 T.S.	Stettin (Vulcan) .	1903	1904	254,500	2	..	10 *4·1-in.*, 14 M. . .	2 (sub.)	23·28 *t*	800	249

2nd cl. *cr.*	**Hansa**	shd.	5791	345½	57¾	21¾	10,000 B.	Stettin (Vulcan)	1898	1899	..	4 N.S.	4 N.S.	2 *8·2-in.*, 8 *5·9-in.*, 10 *3·4-in.*, 4 M.	3 (sub.)	19·5	825	465
,, ,,	**Hertha**		5569	344½	57	21¾	10,000 B.	Stettin (Vulcan)	1897	1898	..	4 N.S.	4	2 *8·2-in.*, 6 *5·9-in.*, 14 *3·4-in.*, 4 M.	3 (sub.)	19·5 *t*	825	465
g. b.	**Iltis**	shd.	881	203½	29¾	10¾	1300 T.	Danzig (Schichau)	1898	1898	100,000	..	..	8 *3·4-in.*, 6 *1·4-in.*, 2 M.	..	13·5 *t*	165	121
3rd cl. *cr.*	**Irene**	shd.	4224	308	46	21	8000	Stettin (Vulcan)	1887	1888	220,000	3	..	4 *5·9-in.*, 8 *4·1-in.*, 6 *2·1-in.*, 1 l., 8 M	3	19·8 *t*	540	365
,, ,,	**Irene (Ersatz)***		3000	..	..	..	..	Bremen (Weser)	Bldg.	..	..	..	..	..	..	..	..	..
g. b.	**Jaguar**	shd.	900	203½	29¾	10¾	1300 T.	Danzig (Schichau)	1898	1899	90,000	..	..	8 *3·4-in.* 6 *1·4-in.*, 2 M.	..	13·5 *t*	165	121
2nd cl. *cr.*	**Kaiserin Augusta**	shd.	5956	387	52½	23	14,000	Kiel (Germania)	1892	1896	..	3½	..	12 *5·9-in.*, 8 *3·4-in.*, 4 M.	3 (1 sub.)	21·0	850	436
3rd ,,	**Karlsruhe**		4830	..	..	..	..	Kiel (Germania)	1912	..	..	2	(4–2½ side)	12 *4·1-in.*, 2 M.	..	27·0	1400	370
,, ,,	**Kolberg**		4232	388¼	46	16½	20,000 (tur.)	Danzig (Schichau)	1908	1910	..	2	..	12 *4·1-in.*, 4 *2·1-in.*, 4 M.	2 (sub.)	25·5	400 900	363
,, ,,	**Köln**		4280	401¾	46	16½	20,000 (tur.)	Kiel (Germania)	1909	1910	..	2	..	12 *4·1-in.*, 4 *2·1-in.*, 4 M.	4 (sub.)	27·2 *t*	400 900	363
,, ,,	**Königsberg**		3350	354¼	43½	15¾	13,200 T.S.	Kiel	1906	1907	..	2	..	10 *4·1-in.*, 8 *2·1-in.*, 4 M.	2 (sub.)	23·5	400 850	295
,, ,,	**Leipzig**		3200	341	43¼	16½	11,000	Bremen (Weser)	1905	1906	254,500	2	..	10 *4·1-in.*, 14 M.	2 (sub.)	23·0	800	286
,, ,,	**Lübeck**		3200	341	43¼	16½	14,000 T.S. tur.	Stettin (Vulcan)	1904	1906	254,500	2	..	10 *4·1-in.*, 14 M.	2 (sub.)	23·0	800	286
g. b.	**Luchs**		962	206¾	30¼	10¾	1300 T.S.	Danzig	1899	1900	91,000	2	..	8 *3·4-in.*, 6 *1·4-in.*, 2 M.	..	13·5 *t*	240	121
,, ,,	**Magdeburg**		4500	446¼	44½	16¾	23,300 Berg. t.	Bremen (Weser)	1911	1912	..	2	(4–2½ side)	12 *4·1-in.*, 2 M.	2 (sub.)	27·5 *t*	1200	370
3rd cl. *cr.*	**Mainz**		4232	388¼	46	16½	20,000 (tur.)	Stettin (Vulcan)	1909	1910	..	2	..	12 *4·1-in.*, 4 *2·1-in.*, 4 M.	2 (sub.)	28·0 *t*	400 900	363
,, ,,	**Medusa**	shd.	2618	328	38½	16	8000 T.S.	Bremen (Weser)	1900	1901	247,000	2	..	10 *4·1-in.*, 14 M.	2 (sub.)	22·0	560	249
,, ,,	**München**	shd.	3200	341	43¼	16½	11,000 T.S.	Bremen (Weser)	1904	1905	254,500	2	..	10 *4·1-in.*, 14 M.	2 (sub.)	23·4 *t*	800	286
,, ,,	**Niobe**	shd.	2603	328	38½	15	8000 T.S.	Bremen (Weser)	1899	1901	217,500	2	..	10 *4·1-in.*, 14 M.	2 (sub.)	20·0	560	250
,, ,,	**Nymphe**	shd.	2618	328	38½	15	8000 T.S.	Kiel (Germania)	1899	1901	217,500							
,, ,,	**Nürnberg**		3396	354¼	43½	15¾	13,200 T.S.	Kiel	1906	1908	..	2	..	10 *4·1-in.*, 8 *2·1-in.*, 4 M.	2 (sub.)	23·5	400 850	295
g. b.	**Panther**		962	206¾	30¼	10¾	1300 T.S.	Danzig	1901	1902	91,000	..	..	8 *3·4-in.*, 6 *1·4-in.*, 2 M.	..	13·5 *t*	240	121

* Particulars unknown or doubtful.

GERMANY.—Cruising Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			kts.	tons.	
3rd cl. *cr.*	**Prinzess Wilhelm**	4224	339½	46	21	8000	Kiel (Germania)	1887	1888	220,000	3	..	4 *5·9-in.*, 8 *4·1-in.*, 6 *2·1-in.*, 4 M.	3 (1sub.)	18·7 *t*	540	365
,, ,,	**Prinzess Wilhelm*** (Ersatz)	5000	..	..	..	..	Kiel	Bldg.	..	..	..	..	..	..	..	..	..
,, ,,	**Rostock**	4830	..	..	..	..	Kiel (Howaldt)	1912	..	..	2	(4-2½ side)	12 *4·1-in.*, 2 M.	..	27·0	1400	370
,, ,,	**Seeadler**	1614	246	33½	15	2800	Hamburg	1892	1892	..	3	..	8 *4·1-in.*, 7 M.	2	16·0	300	165
,, ,,	**Stettin**	3396	354¼	43½	15¾	13,200 T.S. tur.	Stettin (Vulcan)	1907	1907	..	2	..	10 *4·1-in.*, 8 *2·1-in.*, 4 M.	2 (sub.)	23·5	400	295
,, ,,	**Strassburg**	4500	446¼	44½	16¾	22,300 P. tur.	Wilhelmshaven	1911	1912	..	2	(4-2½ side)	12 *4·1-in.*, 2 M.	2 (sub.)	27·0	850 1200	370
,, ,,	**Stralsund**	4500	446¼	44½	16¾	23,000 Berg. t.	Bremen (Weser)	1911	1912	..	2	(4-2½ side)	12 *4·1-in.*, 2 M.	2 (sub.)	28·3 *t*	1200	370
,, ,,	**Stuttgart**	3396	354¼	43½	15¾	13,200 T.S. tur.	Kiel	1906	1908	..	2	..	10 *4·1-in.*, 8 *2·1-in.*, 4 M.	2 (sub.)	23·3 *t*	400 850	295
,, ,,	**Thetis.** shd.	2618	344½	38½	16	8000 T.S.	Danzig	1900	1901	247,000	2	..	10 *4·1-in.*, 14 M.	2 (sub.)	21·8 *t*	560	249
g. b.	**Tiger**	962	203½	29¾	10	1300 T.S.	Danzig	1899	1900	..	..	..	8 *3·4-in.*, 6 *1·4-in.*, 2 M.	..	13·5 *t*	240	121
3rd cl. *cr.*	**Undine** shd.	2657	328	38½	16	8000 T.S.	Kiel (Howaldt)	1902	1904	254,500	2	..	10 *4·1-in.*, 14 M.	2 (sub.)	21·0	700	249
2nd cl. *cr.*	**Victoria Luise**	5569	344½	57	21¾	10,000 Dürr.	Bremen (Weser)	1897	1898	..	4 H.S.	4 H.S.	2 *8·2-in.*, 6 *5·9-in.*, 14 *3·4-in.*, 4 M.	3 (sub.)	19·5 *t*	825	465
,, ,,	**Vineta** shd.	5791	345½	57¾	21¾	10,000 Dürr.	Danzig	1897	1899	..	4 H.S.	4 H.S.	2 *8·2-in.*, 8 *5·9-in.*, 10 *3·4-in.*, 4 M.	3 (sub.)	19·5 *t*	825	465

* Particulars unknown or doubtful.

The 1913 programme includes cruisers to replace the Gefion and Hela.

The Imperial Yacht Hohenzollern, 4187 tons, 9460 I.H.P., 22 knots, carries 3 4·1-in., 12 1·9-in. Q.F. and 4 M. A new Imperial yacht is in hand. River gunboats for China, the Tsingtau, Vaterland Vorwärtz (168 tons), Otter (270 tons). The mining vessels Nautilus and Albatross (2000 tons), Pelikan (2215 tons). Gunnery tender Drache, 765 tons, 15 knots. Submarine salvage vessel Vulkan.

Merchant Cruisers (Auxiliaries to the German Navy).

To what Company belonging.	Name of Ship.	Register Tonnage.	Length.		Beam.		Draught of Water.		Indicated H.P.	Ocean Speed.	When Built.	Armament.
		tons.	ft.	in.	ft.	in.	ft.	in.		knots.		
North German Lloyd	Kronprinzessin Caecilie	19,500	678	0	72	0	29	0	45,000	23½	1906	The armament is of 6-in. and smaller quick-firers.
	Kaiser Wilhelm II.	19,500	678	0	72	0	29	0	45,000	23½	1901	
	Kronprinz Wilhelm	14,800	640	0	66	0	26	3	30,000	23	1901	
	Kaiser Wilhelm der Grosse	14,349	625	0	66	0	27	0	30,000	23	1897	
	George Washington	26,000	..		..		..		20,000	19	1908	

The Hamburg-America liners Berlin and Imperator are classified as auxiliary cruisers. Many other vessels of less than 18 knots speed are in the list, including the Prinz Friedrich Wilhelm (16,900 register tons), and the Berlin (17,000 register tons), 17 knots.

GREECE.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Secondary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	**Giorgios Averoff**	9956	429¾	68¾	24¾	20,000 B	Leghorn (Orlando)	1910	1911	1,100,000	8–3½ K.S.	1¾	7	7	7–6	..	4 *9·2-in.*, 8 *7·5-in.*, 16 *3in.*, 8 *1·8-in.*	3 (sub.)	24·0	700 1600	..
b.	**Hydra** . . .	4808	334½	51¾	23¼	7000	St. Nazairo La Seyne .	1889	1891 1900	..	11¾–4	2½	3	..	13½	..	3 *10·6-in.* Canet, 5 *5·9-in.*, 1 *3·9-in.*, 8 *2·5-in.*, 4 *1·8-in.*, 12 *1·4-in.*	3	17·0	600	400
,,	**Psara** . . .	4808	334½	51¾	23¼	7000	Havre . . La Seyne .	1890	1892 1897	..	11¾–4	2½	3	..	13½	..					
b. cr.	**Salamis** . .	19,000	..	..	..	40,000 (tur.)	Stettin (Vulcan)	Bldg	..	1,240,000	10 K.S.	..	..	..	..	..	8 *14-in.*, 12 *6-in.*, 12 *12-pr.*	..	..	..	..
b.	**Spetsai** . .	4808	334½	51¾	23¼	7000	Havre . . La Seyne .	1889	1891 1900	..	11¾–4	2½	3	..	13½	..	3 *10·6-in.* Canet, 5 *5·9-in.*, 1 *3·9-in.*, 8 *2·5-in.*, 4 *1·8-in.*, 12 *1·4-in.*	3	17·0	600	400

GREECE.—Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						in.	in.			knots.	tons.	
g.v.	**Acheloos** . . .	420	130	24½	11½	400	Blackwall .	1884	1885	..	..	..	2 *3·7-in.* (K.), 3 M.. . .	..	10·0	50	..
,,	**Alphios** . . .	420	130	24½	11½	400	Blackwall .	1884	1885	..	..	..	2 *3·7-in.* (K.), 3 M.. . .	..	10·0	50	..
,,	**Eurotas** . .	420	130	24½	11½	400	Dumbarton .	1884	1885	..	..	..	2 *3·7-in.* (K.), 3 M.. . .	..	10·0	50	..
corv.	**Sfaktirea** . . .	1000	216½	29¼	18	2400	England . .	1885	1886	..	..	..	2 *3·9-in.* (K.), 2 M.. . .	..	14·5	100	..

Torpedo depôt-ship.—**Kanaris**, 1100 tons, 500 I.H.P., 2 3·9-in. (Krupp) guns, 14 knots speed. Mine-layers Aigialla, Monomvassia, Nauplia.

ITALY.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	ins.	ins.	ins.	ins.	ins.			knots.	tons.	
a.c.	**Amalfi** . . .	9956	429¾	68¾	24¾	20,800 B.	Genoa (Odero)	1908	1909	880,000	8–3½ K.S.	1¾	7 K.S.	7 K.S.	7–6 K.S.	..	4 *10-in.*, 8 *7·5-in.*, 16 *3-in.*, 2 M.	3 (sub.)	23·6 t	700 / 1500	687
b.	**Ammiraglio di St. Bon**	9645	344½	69¼	24¾	13,500	Venice . .	1897	1901	..	9¾–4 H.S.	3–1½	6 H.S.	6 H.S.	9¾ H.S.	6 H.S.	4 *10-in.*, 8 *6-in.*, 8 *4·7-in.*, 2 *2·9-in.*, 8 *2·2-in.*, 12 *1·4-in.*, 2 M.	4	18·3 t	600	548
b.	**Benedetto Brin** . .	13,214	426½	78¼	27¼	20,400 B.	Castellammare	1901	1905	..	6–2 H.S.	3	6 H.S.	8 H.S.	10 H.S.	6 H.S.	4 *12-in.*, 4 *8-in.*, 12 *6-in.*, 16 *3-in.*, 8 *1·8-in.*, 4 M.	4 (sub.)	19·5 t	1000 / 2000	811
a.c.	**Carlo Alberto** . .	6396	325	59	23	13,220 t	Spezia . .	1896	1898	..	6–4½ H.S.	1½	6 H.S.	..	6 H.S.	4½ shields	12 *6-in.*, 6 *4·7-in.*, 2 *2·9-in.*, 10 *2·2-in.*, 10 *1·4-in.*, 2 M.	4	19·2 t	1000	500
b.	**Conte di Cavour** .	21,500	557	92	28	24,000 Parsons B. & W.	Spezia . .	1911	..	..	9½–4½ K.S.	1¾	6 K.S.	..	9½ K.S.	5 K.S.	13 *12-in.*, 18 *4·7-in.*, 14 *12-pr.*	3 (sub.)	22·5	1000	999
b.	**Dandolo** . . .	28,000	..	..	..	48,000	..	Pro.	..	..	..	..	..	..	..	..	10 *14-in.*, 20 *6-in.* . .	..	25	..	..
b.	**Dante Alighieri** .	18,300	505	85	27¼	35,000t Parsons Bl.	Castellammare	1910	1912	..	9½–4½ K.S.	1½	6 K.S.	..	10 K.S.	..	12 *12-in.*, 20 *4·7-in.*, 13 *12-pr.*	3 (2 sub.)	23.8 t	1000 / 2500	900
b.	**Doria** (Andrea) .	21,500	570	91	29	24,000 P. tur. Y.	Spezia . .	1913	..	..	10½–6 K.S.	1¾	6 K.S.	..	9½ K.S.	5 K.S.	13 *12-in.*, 16 *6-in.*, 14 *12-pr.*	3 (sub.)	23	1000 / 2500	1000
	Duilio (Caio) .						Castellammare	1913													
b.	**Emanuele Filiberto** .	9645	344½	69¼	24¾	13,500	Castellammare	1897	1901	..	9¾–4 H.S.	3–1	6 H.S.	6 H.S.	9¾ H.S.	6 H.S.	4 *10-in.*, 8 *6-in.*, 8 *4·7-in.*, 2 *2·9-in.*, 8 *2·2-in.*, 12 *1·4-in.*, 2 M.	4	18·3 t	600	536
a.c.	**Francesco Ferruccio**	7294	344	59¾	23¼	13,500 Nic.	Venice . .	1902	1904	..	6–3 H.S.	1½	6 H.S.	5 H.S.	6 H.S.	6 H.S.	1 *10-in.*, 2 *8-in.*, 14 *6-in.*, 10 *2·9-in.*, 6 *1·8-in.*, 2 M.	4 (sub.)	20·0	655 / 1200	540
a.c.	**Giuseppe Garibaldi**					14,713 t Nic.	Sestri-Ponente (Ansaldo)	1899	1901												
b.	**Giulio Cesare** .	21,500	557	92	28	24,000 P. B.&W.	Sestri-Ponente (Ansaldo)	1911	..	..	9½–4½ K.S.	1¾	6 K.S.	..	9½ K.S.	5 K.S.	13 *12-in.*, 18 *4·7-in.*, 14 *12-pr.*	3 (sub.)	22·5	1000	999
b.	**Leonardo da Vinci**					P. Bl.	Genoa (Odero)	1911													
a.c.	**Marco Polo** . .	4511	327	48¼	19½	10,543 t	Castellammare	1892	1894	344,400	4	1	4	4	4	..	6 *5·9-in.*, 10 *4·7-in.*, 2 *2·9-in.*, 9 *2·2-in.*, 4 *1·4-in.*, 2 M.	4 (1 sub.)	19·0 t	600	394
b.	**Morosini** . . .	28,000	..	..	..	48,000	..	Pro.	..	..	..	..	..	..	..	..	10 *14-in.*, 20 *6-in.* . .	..	25	..	..

ITALY.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Second-ary.	Armament. Guns.	Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			kts.	tons.	
b.	Napoli . .	12,425	435½	73½	27¼	20,000 B.&W.	Castellammare	1905	1909	1,120,000	9¾–4 H.S.	2	8 H.S.	8 H.S.	8 H.S.	6 H.S.	2 *12-in.*, 12 *8-in.*, 12 *3-in.*, 12 *1·8-in.*	2 (sub.)	22·0	1000/2000	711
	Regina Elena .					20,000 B.	Spezia . .	1904	1907												
a.c.	Pisa . . .	9956	429¾	68¾	24¾	18,000 B.	Leghorn (Orlando)	1907	1909	..	8–3½ K.S.	1¾	7 K.S.	7 K.S.	7–6 K.S.	..	4 *10-in.*, 8 *7·5-in.*, 16 *3-in.*, 2 M.	3 (sub.)	23·0	700/1600	687
b.	Regina Margherita .	13,214	426½	78¼	27¼	20,664 Nic.	Spezia . .	1901	1904	..	6 H.S.	3	6 H.S.	8 H.S.	8 H.S.	6 H.S.	4 *12-in.*, 4 *8-in.*, 12 *6-in.*, 16 *3-in.*, 8 *1·8-in.*, 4 M.	4 (sub.)	20·2 *t*	1000/2000	811
b.	Re Umberto . .	13,673	400	76¾	28½	19,500	Castellammare	1888	1893	1,058,500	4	3	4	2¾	18	..	4 *67-ton* (A.), 8 *6-in.*, 16 *4·7-in.*, 2 *9-in.*, 15 *2·2-in.*, 14 *1·4-in.*, 2 M.	5	19·0	1200	785
b.	Roma . . .	12,425	435½	73½	27¼	20,000 B. & W.	Spezia . .	1907	1909	1,120,000	9¾–4 H.S.	2	8 H.S.	8 H.S.	8 H.S.	6 H.S.	2 *12-in.*, 12 *8-in.*, 12 *3-in.*, 12 *1·8-in.*	2	22·0	1000/2000	711
a.c.	San Giorgio .	9832	429¾	68¾	24¾	18000 Bl.	Castellammare	1908	1910	..	8–3½ K.S.	1¾	7 K.S.	7 K.S.	7–6 K.S.	7 K.S.	4 *10-in.*, 8 *7·5-in.*, 16 *3-in.*, 8 *1·8-in.*	3 (sub.)	22·5	700/1600	643
	San Marco .					18000 tur.															
b.	Sardegna . . .	13,640	411	76¾	28½	19,650 *t*	Spezia . .	1890	1895	1,057,440	4	3	4	2¾	14¼ *comp.*	..	4 *67-ton* (A.), 8 *5·9-in.*, 16 *4·7-in.*, 2 *2·9-in.*, 20 *2·2-in.*, 10 *1·4-in.*, 2 M.	5	20·1 *t*	1200	785
b.	Sicilia . . .	13,087	400	76¾	28½	19,500	Venice . .	1891	1895	1,050,000	4	3	4	2¾	18 *comp.*	..	4 *67-ton* (A.), 8 *5·9-in.*, 16 *4·7-in.*, 2 *2·9-in.*, 20 *2·2-in.*, 10 *1·4-in.*, 2 M.	5	19·2 *t*	1200	785
a.c.	Varese . . .	7294	344	59¾	23⅓	13,500 B.	Leghorn (Orlando)	1899	1901	..	6–4½ H.S.	1½	6 H.S.	5 H.S.	6 H.S.	6 H.S.	1 *10-in.*, 2 *8-in.*, 14 *6-in.*, 10 *2·9-in.*, 6 *1·8-in.*, 2 M.	4	20·0	650/1200	500
a.c.	Vettor Pisani . .	6396	325	59	23	13,000	Castellammare	1895	1897	..	6 H.S.	1½	6 H.S.	..	6 H.S.	4½ shields	12 *6-in.*, 6 *4·7-in.*, 2 *2·9-in.*, 10 *2·2-in.*, 10 *1·4-in.*, 2 M.	4	20·0	600	504
b.	Vittorio Emanuele III	12,425	435½	73½	27¼	20,000 B.	Castellammare	1904	1907	1,120,000	9¾–4 H.S.	2	8 H.S.	8 H.S.	8 H.S.	6 H.S.	2 *12-in.*, 12 *8-in.*, 12 *3-in.*, 12 *1·8-in.*	2 (sub.)	22·0	1000/2000	711

Two battleships or battle-cruisers, Giuseppe Mazzini and Goffredo Mameli, to be begun 1913.

ITALY.—Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armaments.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
to.cr.	**Agordat**	1292	287½	30½	11	8000	Castellammare	1899	1900	..	1	..	4 *4·7-in.*, 8 *2·2-in.*, 2 *1·4-in.*	2	22·0	160	158
to.g.b.	**Aretusa**	833	230	26¾	11¾	4420	Leghorn (Orlando)	1891	1892	72,920	1	..	1 *4·7-in.*, 6 *2·2-in.*, 3 *1·4-in.*	6	20·7 *t*	120	111
3rd cl. *cr.*	**Basilicata**	2550	..	..	..	...	Castellammare	Bldg.	..	..	..	..	6 *6-in.*, 6 *12-pr.*, 2 *6-pr.*	..	..	..	..
„ „	**Campania**																
„ „	**Calabria**	2428	249¼	42	16¾	4094 *t*	Spezia	1894	1897	183,120	2	..	4 *5·9-in.*, 6 *4·7-in.*, 1 *2·9-in.*, 8 *2·2-in.*, 8 *1·4-in.*, 2 M.	2	16·4 *t*	500	257
to.cr.	**Coatit**	1292	287½	30½	11	8160	Castellammare	1899	1902	..	1	..	4 *4·7-in.*, 8 *2·2-in.*, 2 *1·4-in.*	2	21·1 *t*	160	158
3rd cl. *cr.*	**Elba*** shd.	2689	272½	40¾	16½	7471 *t*	Castellammare	1893	1895	200,000	2	4½	2 *5·9-in.*, 8 *4·7-in.*, 8 *2·2-in.*, 2 *1·4-in.*, 1 M.	2	17·9 *t*	500	272
„ „	**Etruria**	2245	262½	39½	16½	7585 *t*	Leghorn (Orlando)	1891	1893	183,120	2	4½	4 *5·9-in.*, 6 *4·7-in.*, 1 *2·9-in.*, 8 *2·2-in.*, 10 *1·4-in.*, 2 M.	2	19·84 *t*	400	257
g.v.	**Governolo**	1235	185	33¾	13¾	1100	Venice	1894	1896	58,440	..	..	4 *4·7-in.*, 4 *2·2-in.*, 2 *1·4-in.*, 2 M.	..	13·0	200	131
to.g.b.	**Iride**	931	229½	27	10¼	4242	Castellammare	1891	1892	72,920	1	..	1 *4·7-in.*, 6 *2·2-in.*, 3 *1·4-in.*	6	19·6 *t*	120	111
3rd cl. *cr.*	**Libia**	3800	..	..	..	12,500	Sestri (Ansaldo)	1912	..	..	..	..	2 *6-in.*, 6 *4·7-in.*, 8 *3-pr.*	2	22·0	..	..

* Ballooning service.

ITALY.—Cruising Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
3rd cl. cr.	Liguria	2245	262½	39¼	16¾	7677 *t*	Sestri (Ansaldo)	1893	1894	183,120	2	4½	4 *5·9-in.*, 6 *4·7-in.*, 1 *2·9-in.*, 8 *2·2-in.*, 10 *1·4-in.*, 2 M.	2	19·6 *t*	430	257
Scout	Marsala	3400	460½	42¾	13¼	22,500 P. tur. Bl.	Castellammare	1912	..	..	1½	..	6 *4·7-in.* and 6 *12-pr.*	2	29·0	800	240
to.g.b.	Minerva	833	246	27½	11¾	4800 W.T.	Sestri (Ansaldo)	1892	1893	72,720	1	..	1 *4·7-in.*, 6 *2·2-in.*, 3 *1·4-in.*	5	21·0	120	111
Scout	Nino Bixio	3400	460¼	42¾	13¼	22,500 Bl. Cur. t.	Castellammare	1911	..	..	1½	..	6 *4·7-in.* and 6 *12-pr.*	2	29·0	800	240
3rd cl. cr.	Puglia	2498	269	41	16¾	7000	Taranto	1898	1900	200,000	4½	1	4 *5·9-in.*, 6 *4·7-in.*, 1 *2·9-in.*, 8 *2·2-in.*, 8 *1·4-in.*, 2 M.	2	20·0	650	257
Scout	Quarto	3250	432	42¾	13¼	22,500 P. tur. Bl.	Venice	1911	..	..	1½	..	6 *4·7-in.* and 6 *12-pr.*	2	29·0	450 (oil)	240
g.v.	Sebastiano Caboto	800	250	31¾	9	2000	Palermo	1912	..	..	..	..	6 *12-pr.*, 4 M.	..	13·0	100	..

Etna (3474 tons), converted into a training ship. Goito, Montebello, Partenope and Tripoli, mining vessels. *Subsidised auxiliary cruisers and despatch vessels.*—Nord America (La Veloce S.S. Co.), Regina Margherita, Galileo Galilei, Marco Polo, Umberto I., Cristoforo Colombo, Elettrico, Candia, Malta, Perseo, Orione, and some others (Navigazione Generale), Messina and Siracusa (19¾ knots), Catania and Palermo (23 knots), Principessa Mafalda (18½ knots) Italian Lloyd. The armament of these vessels is 2 2·2-in. Q.F., and 4 1·4-in. M. The coal and liquid fuel transports Bronte and Sterope (9490 tons) are completed. Another, 6000 tons capacity, to be built. Provision is made for a docking vessel for submarines, and a river gunboat. Lagoon gunboats Brondolo and Marghera. A surveying vessel, Ammiraglio Magnaghi, 1800 tons, 14 knots, is in hand. Small vessels, Capitano Verri (*ex*-Thetis) and Bengazi (*ex*-Derna) captured from the Turks.

JAPAN.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Second-ary.	Armament. Guns.	Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	Adzuma	9436	431½	59¼	24¾	17,000 B.	St. Nazaire	1899	1901	..	7–3½ H. S.	3	5 H.S.	..	6 H. S.	6 H.S.	4 *8-in.*, 12 *6-in.*, 12 *3-in.*, 8 *1·8-in.*	5 (4 sub.)	20·0	600 / 1275	482
b.	Aki	19,800	482	83½	27½	18,000 My. tur.	Kure	1907	1911	..	9–5 K. S.	2–3	8	..	9	6	4 *12-in.*, 12 *10-in.*, 8 *6-in.*, 8 *12-pr.*, 4 M.	5 (sub.)	20·5	..	940
,,	Asahi	15,800	400½	75¼	27½	15,000 B.	Clydebank	1899	1900	..	9–4 H. S.	4–2½	6 H.S.	12 H.S.	14 H. S.	6 H.S.	4 *12-in.*, 14 *6-in.*, 20 *12-pr.*, 8 *3-pr.*, 4 *2½-pr.*	4 (sub.)	18	700 / 1549	750
a.c.	Asama	9700	408	67	24½	19,000 *t*	Elswick	1898	1899	..	7–3½ H. S.	2	5 H.S.	..	6	6 H.S.	4 *8-in.*, 14 *6-in.* (A.), 12 *12-pr.*, 8 *2½-pr.*	5 (4 sub.)	22·1 *t*	600 / 1409	482
,,	Aso (*ex* Bayan)	7726	443	55¾	22	17,400 My. *t.*	La Seyne	1900	1902	..	8–3 K.S.	2	3 K.S.	..	7 K.S.	3 K.S.	2 *8-in.*, 8 *6-in.*, 22 small, l., and M.	2 (sub.)	22 *t*	750 / 11,000	570
,,	Chiyoda	2450	308	42½	14	5700 B.	Clydebank	1889	1890	..	4½	1–2	..	..	..	..	10 *4·7-in.*, 14 *3-pr.*, 3 M.	3	17·5	420	300
b.	Fuji	12,320	374	73	26½	14,000	Thames	1896	1897	..	18–6 H. S.	4–2½	4 H.S.	..	14 H. S.	6 H.S.	4 *12-in.*, 10 *6-in.*, 20 *3-pr.*, 4 *4½-pr.*	5 (4 sub.)	19·2 *t*	1100	600
b	Fuso *	31,000	..	..	..	45,000 tur.	Kure	Bldg.	..	..	..	..	..	..	..	..	12 *14-in.*, 16 *6-in.*	..	22	..	..
b.c.	Haruna	27,500	704	92	27½	70,000 My. P. t. My. C. t.	Kobe (Kawasaki)	Bldg.	..	..	10 K.S.	2¾	..	..	10 K.S.	..	8 *14-in.*, 16 *6-in.*, 5 M.	8 (sub.)	27	1000 / 3500	1100
,,	Hiyei						Yokosuka	1912	..												
,,	Hizen (*ex* Retvizan)	12,700	374	72¼	25	16,000 My.	Philadelphia	1900	1902	..	9–4 K.S.	4	6–2 K.S.	9 K.S.	10 K.S.	5 K.S.	4 *12-in.*, 12 *6-in.*, 20 *3-pr.*, 6 *1-pr.*	2	18·0	800 / 2000	778
a.c.	Ibuki	14,620	450½	75½	26¼	27,000 My. tur.	Kure	1907	1909	..	7–4 K.S.	2	5 K.S.	..	9 K.S.	..	4 *12-in.*, 8 *8-in.*, 14 *4·7-in.*, 3 *1·8-in.*, 2 l., 4 M.	3 (sub.)	22	2000	820
b.	Idzumo	9750	400	68½	24½	17,300 B. *t.*	Elswick	1899	1900	..	7–3½ H.N.S.	2½	5 H.N.S.	..	6 H. N.S.	6 H. N.S.	4 *8-in.*, 14 *6-in.*, 12 *12-pr.*, 8 *2½-pr.*	4 (sub.)	22·0	600 / 1412	672
,,	Iwate							1900	1901										21·7 *t*		
a.c.	Ikoma	13,750	440	75	26	20,500 My.	Kure	1906	1908	..	7–5 K.S.	1½	..	..	7 K.S.	..	4 *12-in.*, 12 *6-in.*, 12 *4·7-in.*, 2 *1·8-in.*, 2 l., 4 M.	3 (sub.)	21·0	600 / 2000	817

* Particulars uncertain.

JAPAN.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	**Iwami** (*ex* Orel) .	13,516	367½	76	26	16,000 My.	St. Petersburg (Galerny)	1902	1904	..	9–4 K.S.	2½–1½	6 K.S.	9 K.S.	10 K.S.	6 K.S.	4 *12-in.*, 6 *8-in.*, 20 *3-in.*, 20 *3-pr.*, 6 *1-pr.*	3 (2 sub.)	18·0	800 / 2000	740
b.	**Kashima** . .	16,400	425	78⅛	27	17,280 Nic.	Elswick .	1905	1906	..	9–4 K.S.	3–2½	6	6	9 K.S	6 K.S.	4 *12-in.*, 4 *10-in.*, 12 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 6 M., 2 l.	5 (sub.)	19·2 *t*	750 / 2150	980
a.c.	**Kasuga** . .	7630	344	59¾	24¼	13,500	Sestri Ponente	1902	1904	760,000	6 H. N.S.	1½	6 H. N.S.	6 H. N.S.	6 H. N.S.	6 H. N.S.	1 *10-in.*, 2 *8-in.*, 14 *6-in.*, 10 *3-in.*, 6 *1·8 in.*, 2 M.	4	20·0	600 / 1150	500
b.	**Katori** . .	15,950	420	78	27	18,500 *t*, Nic.	Barrow .	1905	1906	..	9–5 K.S.	3–2	6	6	10 K.S.	6 K.S.	4 *12-in.*, 4 *10-in.*, 12 *6-in.*, 10 *12-pr.*, 3 *3-pr.*, 6 M., 2 l.	5 (sub.)	19·5 *t*	750 / 1800	980
b.	**Kawachi** . .	20,800	480	84	28	26,500 tur.	Kure . .	1910	1912	..	12–9½ K.S.	2½	9 K.S.	..	12 K.S.	..	12 *12-in.*, 10 *6-in.*, 10 *4·7-in.*, 8 small, l. and M.	5 (sub.)	20·5	900 / 2500	960
b.c.	**Kirishima** . .	27,500	704	92	27½	70,000 My. P. t.	Nagasaki (Mitsubishi)	Bldg.	..	..	10–4 K.S.	2¾	..	..	10 K.S.	..	8 *14-in.*, 16 *6-in.*, 5 M., 16 smaller	8 (sub.)	28·0	1000 / 3500	1100
,,	**Kongo** . .	27,500	704	92	27½	70,000 Y. P. t.	Barrow .	1912	..	2,500,000	10–4 K.S.	2¾	..	..	10 K.S.	..	8 *14-in.*, 16 *6-in.*, 5 M., 16 smaller	8 (sub.)	28·0	1000 / 3500	1100
a.c.	**Kurama** . .	14,620	450½	75½	26¼	27,000 My.	Yokosuka .	1907	1911	..	7–4 K. S.	2	5 K.S.	..	9 K. S.	..	4 *12-in.*, 8 *8-in.*, 14 *4·7-in.*, 3 *1·8-in.*, 2 l., 4 M.	3 (sub.)	22·0	2000	820
b.	**Mikasa** . .	15,200	400	76	27¼	16,431 B.	Barrow .	1900	1902	..	9–4 H.N.S.	3	6 H. N.S.	12 H. N.S.	14 H. N.S.	6 H. N.S.	4 *12-in.*, 4 *10-in.*, 4 *6-in.*, 26 small, 8 M.	4 (sub.)	18·5 *t*	700 / 1520	935
c.d.	**Minoshima** (*ex* Seniavine)	4792	265	52½	17	5000 My.	St. Petersburg	1894	1895	410,000	10	3	..	..	7–8	..	4 *10-in.*, 4 *4·7-in.*, 6 *1·8-in.*, 8 M.	4	16·0	400	318

a.c.	**Nisshin** . .	7630	344	59¾	24¼	13,500	Sestri Ponente	1903	1904	760,000	6 H. N.S.	1½	6 H. N.S.	6 H. N.S.	6 H. N.S.	6 H. N.S.	4 *8-in.*, 14 *6-in.*, 10 *3-in.*, 6 *1·8-in.*, 2 M.	4	20·0	600 / 1150	500
c.d.	**Okinoshima** (*ex* Apraxine)	4126	277½	52½	17½	5757 *t.*	St.Petersburg (New Admiralty)	1896	1898	..	10 H. S.	3	..	..	7¾ K. S.	..	3 *10-in.*, 4 *4·7-in.*, 10 *1·8-in.*, 12 *1·4-in.*	4	15·0 *t*	215	318
b.	**Sagami** (*ex* Peresviet)	12,674	401¼	71¾	26	14,500 My.	St.Petersburg (Baltic)	1898	1901	..	9–7 H. S.	2¾	6 H. S.	9 H. S.	9 H. S.	6 H. S.	4 *10-in.*, 10 *6-in.*, 16 *12-pr.*, 10 *3-pr.*, 17 *1-pr.*	2 (sub.)	18·0	800 / 2056	732
b.	**Satsuma** . .	19,350	482	83½	27½	18,000 My.	Yokosuka .	1906	1910	..	9–5 K. S.	2–3	8	..	9	6	4 *12-in.*, 12 *10-in.*, 12 *4·7-in.*, 4 *12-pr.*, 4 M.	5 (sub.)	20·5	1000 / 2500	940
b.	**Settsu** . . .	20,800	480	84	28	26,500 tur.	Yokosuka .	1911	1912	..	12–9½ K.S.	2½	9 K.S.	..	12 K.S.	..	12 *12-in.*, 10 *6-in.*, 10 *4·7-in.*, 8 small, l. and M.	5 (sub.)	20·5	900 / 2500	960
b.	**Shikishima** . .	14,850	400	75¼	26½	16,355 B.	Thames .	1898	1899	..	9–4 H.N.S.	4–2½	6 H. N.S.	12 H. N.S.	14	6 H. N.S.	4 *12-in.*, 14 *6-in.*, 20 *12-pr.*, 8 *3-pr.*, 4 *2½-pr.*, 8 M.	5 (4 sub.)	18·3	700 / 1722	741
b.	**Suo** (*ex* Pobieda) .	12,674	401¼	71½	26	14,500 My.	St.Petersburg (Baltic)	1900	1901	..	9½–4 H. S.	2¾	9 H. S.	9 H. S.	9 H. S.	6 H. S.	4 *10-in.*, 10 *6-in.*, 16 *12-pr.*, 10 *3-pr.*, 17 *1-pr.*, 2 l.	2 (sub.)	18·0	800 / 2056	732
b.	**Tango** (*ex* Poltava)	10,960	367½	69	26	11,255 My.	St.Petersburg	1894	1898	1,098,000	15¾	3½	4	9	10 H. S.	6	4 *12-in.*, 12 *6-in.*, 14 small	2	16·0	900	700
a.c.	**Tokiwa** . .	9700	408	67	24½	20,556 *t.*	Elswick .	1898	1899	..	7–3½ H. S.	2	5 H.S.	..	6 H. S.	6 H.S.	4 *8-in.*, 14 *6-in.* (A.), 12 *12-pr.*, 8 *2½-pr.*	5 (4 sub.)	23·0	600 / 1409	500
,,	**Tsukuba** . .	13,750	440	75	26	20,500 My.	Kure . .	1905	1907	..	7–5 K. S.	1½	..	..	7 K. S.	..	4 *12-in.*, 12 *6-in.*, 12 *4·7-in.*, 2 *1·8 in.*, 2 l., 4 M.	3 (sub.)	21·0	600 / 2000	817
,,	**Yakumo** . .	9850	407¾	64¼	23¾	16,000 B.	Stettin .	1899	1901	..	7–3½ H. S.	2½	5 H.S.	..	6 H. S.	6 H.S.	4 *8-in.* (A.), 12 *6-in.*, 12 *12-pr.* (A.), 8 *2½-pr.*	5 (4 sub.)	20·0	600 / 1100	500

Iki (*ex* Nicolai I.), 9672 tons (1888), 2 *12-in.*, 4 *9-in.*, 8 *6-in.*, gunnery ship.

JAPAN.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
cr.	**Akashi** . .	2657	295¼	41¾	16½	8500	Yokosuka . .	1897	1898	327,000	2	4½ shield	2 *6-in.* (A.), 6 *4·7-in.*, 10 *3-pr.*, 2 *2½-pr.*, 4 M.	2	20·0	200 544	300
”	**Akitsushima** .	3150	302	42½	18¼	8400	Yokosuka . .	1892	1893	..	3	..	4 *6-in.*, 6 *4·7-in.*, 10 *3-pr.* .	4	19·0	..	330
t.g.b.	**Chihaya** . . .	1250	273	31½	10	5500 Nor.	Yokosuka . .	1900	1901	..	..	..	2 *4·7-in.*, 4 *12-pr.* . .	5	21·0	123 344	170
cr.	**Chitose** . . .	4760	395	49	18	15,500	San Francisco	1898	1899	205,200	4½	4½ shield	2 *8-in.*, 10 *4·7-in.*, 12 *12-pr.*, 6 *2½-pr.*	4	22·5	350 1000	405
”	**Hashidate** . . .	4277	295	50¾	21¼	5400 My.	Yokosuka . .	1891	1893	..	2	12	1 *12·5-in.* (Canet), 11 *4·7-in.*, 5 *6-pr.*, 11 *3-pr.*, 6 M.	4	17·0	400	350
”	**Hirado** . . .	4800	475	46½	16¾	22,500 P. tur. My.	Kobe . .	1911	1912	..	..	..	6 *6-in.*, 4 *3-in.*, 4 M. . .	2 (sub.)	26	500 1000	390
”	**Itsukushima** . .	4277	295	50¾	21½	5400 B.	La Seyne . .	1891	1893	..	2	12	1 *12·5-in.* (Canet), 11 *4·7-in.*, 5 *6-pr.*, 11 *3-pr.*, 6 M.	4	17·0	400	350
”	**Kasagi** . . .	4760	374½	48¾	19	13,492	Philadelphia .	1898	1899	205,200	4½–1¾	4½ shield	2 *8-in.*, 10 *4·7-in.*, 12 *12-pr.*, 6 *1·8-in.*	4	22·7 t	350 1000	405
t.g.b.	**Makigumo** . . (*ex* Posadnik)	400	192½	24¼	7½	3600	Elbing . .	1892	1892	111,000	..	..	2 *1·8-in.*, 7 *1·4-in.*, 3 M. .	3	22·0	90	87
Scout	**Mogami** . . .	1329	316	31½	9¾	8000 turbines	Sasebo . .	1907	1908	..	2½	..	2 *4·7-in.*, 4 *12-pr.* . .	2	23·0	..	180
cr.	**Niitaka** . . .	3365	235½	44	16½	10,000 Nic.	Yokosuka. .	1902	1905	..	2½	..	6 *6-in.*, 10 *3-in.*, 4 *2½-pr.* .	..	20·0	600	320
”	**Otawa** . . .	3000	341	42½		10,000 My.	Yokosuka . .	1903	1904	..	..	..	2 *6-in.*, 6 *4·7-in.*, 4 *12-pr.*, 2 M., 2 l.	..	20·0	600 875	310
t.g.b.	**Shikinami** . . (*ex* Gaidamak)	400	192½	24¼	7½	3000	Abo, Finland .	1893	1894	..	..	..	2 *1·8-in.*, 7 *1·4-in.*, 10 M. .	3	22·0	90	87

cr.	**Shikuma**	4800	475	46½	16¾	22,500 Cur. t. My.	Sasebo	1911	1912	..	..	..	6 *6-in.*, 4 *3-in.*, 4 M.	2 (sub.)	26	500 1000	390
„	**Soya** (*ex* Varyag)	6500	420	52	20¾	20,000 My.	Philadelphia	1899	1900	..	3	..	12 *6-in.*, 12 *12-pr.*, 6 *3-pr.*	3 (sub.)	23·0	770 1250	571
„	**Suma**	2657	306¾	40	16½	8500	Yokosuka	1896	1898	237,000	2 shield	4½ 4 M.	2 *6-in.*, 6 *4·7-in.*, 12 *3-pr.*	2	20·0	200	300
„	**Sutsuya** (*ex* Novik)	3080	347	41½	16	18,000 My.	Danzig (Schichau)	1900	1902	..	2	..	2 *4·7-in.*, 8 other Q.F. and M.	2	25·0	600	330
t.g.b.	**Tatsuta**	875	240	27½	13	5500	Elswick	1894	1894	..	..	..	2 *4·7-in.*, 4 *3-pr.*	5	21·0	200	150
cr.	**Tone**	4035	400	48½	16¾	15,000 My.	Sasebo	1907	1908	..	2–3	..	2 *6-in.*, 10 *4·7-in*, 2 *12-pr.*	3	23·0	750 1000	392
Scout	**Tsugaru** (*ex* Pallada)	6630	413¼	55¾	21	11,610 My.	St. Petersburg (Galerny)	1899	1902	..	2½	..	8 *6-in.*, 20 *12-pr.*, 8 *1-pr.*	4	20·0	900 1400	422
cr.	**Tsushima**	3365	235½	44	16½	10,000 Nic.	Kure	1902	1904	..	2½	..	6 *6-in.*, 10 *3-in.*, 4 *2½-pr.*	..	20·0	600	320
g.b.	**Uji**	620	180	27¾	10	1000 B.	Kure	1903	1905	..	..	..	4 *12-pr.*, 3 M.	..	13·0	100	150
cr.	**Yahagi**	4800	475	46½	16¾	22,500 P. tur. My.	Nagasaki	1911	1912	..	..	..	6 *6-in.*, 4 *3-in.*, 4 M.	2 (sub.)	26	500 1000	390
„	**Yodo**	1230	300	32	9¾	6500	Sasebo	1908	1909	..	2½	..	2 *4·7-in.*, 4 *12-pr.*	2	22·0	..	180

Repair ship Kwanto Maru. Training vessels Amagi, Maja, Manju, Kangu, Iwaki, Teuriu, Tsukushi. Amakusa, mining vessel (*ex* Amur).
Mercantile auxiliaries: Umegaku Maru, Sakwra Maru, 3200 tons, 21 knots; Tsijo Maru, Tenjo Maru, 13,400 tons, 20 knots.

NETHERLANDS.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots	tons.	
a.g.b.	Brinio																				
,,	Bruno	520	171	28	9¼	1200	Amsterdam	Bldg.	..	..	2 K.S.	¾	..	..	..	..	4 *4·1-in.*, 2 M.	..	16	oil	49
,,	Friso																				
c.d.s.t.	De Ruyter	5014	316¾	51½	21¾	6377 t.	Amsterdam	1900	1904	347,500	6–4 H.N.S.	2	..	..	10 H.N.S.	3 H.S.	2 *9·4-in.*, 4 *5·9-in.*, 10 *2·9-in.*, 4 *1·4-in.*	3 2 sub.	16·5 t	680	444
,,	Evertsen	3464	282¾	47	16¾	4735	Flushing	1894	1896	..	6–4 H.S.	2	..	..	9½ H.S.	3 H.S.	3 *8·2-in.*, 2 *5·9-in.*, 6 *2·9-in.*, *8 1·4-in.*	3	16·0	280	268
,,	Hertog Hendrik	5014	316¾	51½	21¾	6000 Y.	Amsterdam	1902	1903	347,500	6 H.N.S.	2	..	..	10 H.N.S.	3 H.S.	2 *9·4-in.*, 4 *5·9-in.*, 10 *2·9-in.*, 4 *1·4-in.*, 2 l.	3	16·5	680	444
t. & b.	Jacob van Heemskerck	5211	316¾	51½	21¾	6000 Y	Amsterdam	1906	1908	347,500	6–4 H.N.S.	2	..	..	10 H.N.S.	..	2 *9·4-in.*, 6 *5·9-in.*, 10 *12-pr.*, 4 *1·4-in.*, 2 l.	3 2 sub	16·0	680	441
c.d.s.t.	Koningin Regentes	5014	316¾	51½	21¾	7290 Y.	Amsterdam	1900	1902	347,500	6–4 H.N.S.	2	..	..	10 H.N.S.	..	2 *9·4-in.*, 4 *5·9-in.*, 6 *2·9-in.*, 4 *1·4-in.*, 2 l.	3 2 sub.	16·5	680	444
t. & b.	Koningin Wilhelmina der Nederlanden . shd.	4527	327½	48¾	20	4600	Amsterdam	1892	1894	..	..	3	..	..	11	..	1 *11-in.*, 1 *8·2-in.*, 2 *6·6 in.*, 2 *6·6-in.*, 4 *2·9-in.*, 4 *1·4-in.*, 2 M.	4	16·5	448	293
c.d.s.t.	Kortenaer	3464	282¾	47	16¾	4400	Amsterdam	1894 1909	1896	..	6 H.S.	2	..	..	9½ H.S.	3 H.S.	3 *8·2-in.*, 2 *5·9-in.*, 6 *2·9-in.*, 8 *1·4-in.*	3	16·0	280	260
t. & b.	Marten Tromp	5211	316¾	51½	21¾	6377 t	Amsterdam	1904	1906	347,500	6–4 H.N.S.	2	..	..	10 H.N.S.	3 H.S.	2 *9·4-in.*, 4 *5·9-in.*, 10 *2·9-in.*, 4 *1·4-in.*	3 2 sub.	16·5 t	680	444
,,	Piet-Hein	3464	282¾	47	16¾	4736 t	Rotterdam	1894	1896	..	6 H.S.	2	..	..	9½ H.S.	3 H.S.	3 *8·2-in.*, 2 *5·9-in.*, 6 *2·9-in.*, 8 *1·4-in.*	3	16·2 t	280	260
,,	Reinier Claeszen	2440	229½	44½	15	350	Amsterdam	1891	1892	..	4¾–2 comp.	3	..	..	11 comp.	6 comp. shield	1 *8·2-in.* (*K.*), 1 *6·6-in.*, 1 *2·9-in.*, 4 *1·9-in.*, 3 *1·4-in.*	2	12·5 t	88	160
,,	De Zeven Provincien	6525	339½	56	20¼	7500 Y.	Amsterdam	1909	1910	..	6–4 K.S.	2	..	..	10 K.S.	..	2 *11-in.*, 4 *5·9-in.*, 10 *12-pr.*	..	16·0	700	440

NETHERLANDS.—Cruising Ships.

((I) denotes vessels of the Dutch Indian Navy.)

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	inches.	inches.			knots.	tons.	
g. v.	Edi (I)	787	179½	30¾	11¾	1100	Flushing	1897	1898	..	..	..	3 4·7-in., 2 2·9-in., 4 1·4-in.	..	13·0	113	95
cr.	Friesland	3847	307	49	17¾	10,000 Y.	Rotterdam	1896	1898	285,700	2	..	2 5·9-in., 6 4·7-in., 4 2·9-in., 8 1·4-in., 4 smaller.	4	19·8 t	400	333
,,	Gelderland	3969	310¾	49	17¾	10,000 Y.	Feijenoord	1898	1900	..	2¼	..	2 5·9-in., 6 4·7-in., 4 2·9-in., 4 1·4-in., 4 M.	4	20·0	850	333
,,	Holland	3847	307	49	17¾	10,000 Y.	Amsterdam	1896	1898	285,700	2	..	2 5·9-in., 6 4·7-in., 4 2·9-in., 8 1·4-in., 4 M.	4	19·6 t	400	333
,,	Koetei (I)	778	179	30¾	11½	1412	Amsterdam	1898	1899	..	..	..	3 4·7-in., 2 2·9-in., 4 1·4-in.	..	13·0	120	97
,,	Mataram (I)	797	179½	30¾	11¾	1100	Amsterdam	1896	1897	..	..	..	3 4·7-in., 2 3-in., 2 1·4-in.	..	13·0	113	95
,,	Noord-Brabant	3969	310¾	49	17¾	10,000 Y.	Flushing	1899	1901	..	2¼	..	2 5·9-in., 6 4·7-in., 4 2·9-in., 4 1·4-in., 4 M.	4	20·0	850	333
,,	Serdang (I)	797	179½	30¾	11¾	1100	Flushing	1897	1898	..	..	..	3 4·7-in., 2 2·9-in., 4 1·4-in.	..	13·0	113	95
,,	Sumatra (I)	1693	229½	37	14	3750	Amsterdam	1890	1892	..	1½	..	1 8·2-in., 1 5·9-in., 2 4·7-in., 1 2·9-in., 4 3-pr., 2 M.	..	17·0	225	183
,,	Utrecht	3969	310¾	49	17¾	10,000	Amsterdam	1898	1900	..	2¼	..	2 5·9-in., 6 4·7-in., 4 2·9-in., 4 1·4-in., 4 M.	4	20·0	850	333
,,	Zeeland	3847	307	49	17¾	10,589 Y. t	Flushing	1897	1898	285,700	2	..	2 5·9-in., 6 4·7-in., 4 2·9-in., 8 1·4-in., 4 M.	4	19·4 t	400	333

Gun-vessels of the Indian Navy: Glatik (417 tons), 1894; Havik, Snip, Sperwer, Kwartel, Favant, and Valk, launched between 1894 and 1903: Argus and Cycloop (438 tons), 1893, many older. Hydrograaf, surveying ship. Surveying vessels in the East Indies: Borneo, 787 tons, Lombok and Sumbawa, 591 tons Mine-layers in the East Indies: Assahan, 787 tons, Siboga, 778 tons. Two (670 tons, 10 knots) mine-layers, Medusa and Hydra are in hand, and a mother ship for submarines.

NORWAY.—Armoured Ships.

Class.	NAME	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			in.	in.			knots.	tons.	
c.d.s.	{ Eidsvold . / Norge . }	3847	290	50½	16½	4500 Y.	Elswick	1900	1901	350,000	6 H.N.S.	2	..	..	6 H.N.S.	6 H.N.S	2 *8·2-in.*, 6 *5·9-in.*, 8 *12-pr.*, 6 *3-pr.*	2 sub.	16·5 *t*	400 600	261
"	Harald Haarfagre . .	3556	280	48½	16½	3700	Elswick	1896	1898	300,000	7 H.S.	2	..	..	8 H.S.	..	2 *8-in.*, 6 *4·7-in.*, 6 *12-pr.*, 6 *1½-pr.*	2 sub.	17·2 *t*	200 500	248
"	Torkenskjold							1897	1899												
"	Two . . .	3400	295¼	50	16½	..	Elswick	Bldg.	..	..	7½ K.S.	2	..	..	..	..	2 *9·4-in.*, 4 *5·9-in.*, some smaller	2 sub.	16·5	..	250

Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
g.b.	Æger . .	387	108½	29½	8	450	Horten	1892	1893	..	1½	..	1 *8·2-in.*, 1 *2·7-in.*, 2 *1·9-in.*	..	9·0	..	43
g.v.	Ellida . .	984	187	32¾	14¼	900	Horten	1880	1881	..	..	..	5 *5·9-in. 4-ton* (K.), 1 *4·7-in.*, 1 l., 2 M.	1	12·0	97	128
"	Frithjof . .	1349	216½	32¾	13¼	300	Horten	1896	1898	..	..	..	2 *4·7-in.*, 4 *2·9-in.*, 4 *1·4-in.*, 2 l.	3 sub.	15·0	120	156
"	Heimdal . .	620	167¼	26¾	11¾	700	Christiania	1892	1893	..	..	..	4 *2·5-in.*	..	12·0	92	62
"	Viking . .	1095	203½	30½	13	2000	Horten	1891	1892	..	1½	..	2 *5·9-in.* (A.), 4 *2·5-in.*, 4 *1·4-in.*, 2 M.	3	15·0	140	156

Eleven Gunboats, of 189 to 280 tons, and of 180 to 450 I.H.P., armed with one large gun and machine guns.

PORTUGAL.—Armoured Ship.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots	tons.	
b.	**Vasco da Gama**	2972	233	40	18¼	6000 W.T.	Blackwall Leghorn	1876	1878 1903	132,000	9¾–4	3	6 K.S.	..	7¾ K.S.	..	2 *8-in.*, 4 *4·7-in.*, 2 *2·5-in.*, 2 *1-pr.*, 4 M.	2 (sub.)	15·0	300	218

Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
cr.	**Adamastor**	1962	250	35	14	4000	Leghorn	1896	1897	..	3	5	2 *5·9-in.*, 4 *4·7-in.*, 4 *2·2-in.*, 4 M.	3	18·0 *t*	270	232
„	**Almirante Reis** (ex Dom Carlos I.)	4100	360	46½	17½	12,500 Y.	Elswick	1898	1899	..	4	..	4 *5·9-in.* (A.), 8 *4·7-in.*, 12 *3-pr.*, 6 *1-pr.*, 4 M.	5 (3 sub.)	22·0	1000	260
g.v.	**Dom Luiz I.**	710	151	27¼	13¾	512	Lisbon	1895	1896	..	..	..	4 *4·1-in.*, 3 *2·5-in.*, 3 M.	..	9·9	100	120
„	**Patria**	620	196¾	27½	8½	1800	Lisbon	1903	1905	..	..	..	4 *4-in.*, 6 *1·8-in.*	..	15·0	..	160
cr.	**Republica.** ex Rainha Amelia)	1640	246	36	14¾	5000 Nor.	Lisbon	1899	1901	..	1	..	4 *5·9-in.*, 2 *3·9-in.*, 2 *3-pr.*, 4 M.	2	20·6 *t*	300	250
„	**São Gabriel**	1772	246	35½	14¼	4000 N.S.	Havre	1898	1899	..	1½	..	2 *5·9-in.* (*Canet*), 4 *4·7-in.*, 8 *1·8-in.*, 2 M.	1	17·5 *t*	500	200

There are several small gunboats for Mozambique and Timor, and some river-gunboats. Mine-layer, Vulcano, 110 ft. long, 19 ft. 6 in. beam, 400 I.H.P., 12 knots, launched by Thornycroft, 1909. Gunboat Macao, 107 tons, built by Yarrow. Lynce, fishery-protection vessel, launched at Leghorn.

RUSSIA.—Armoured Ships.

(B.S., Black Sea Fleet.)

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Deck.	Side above Belt.	Bu'kheads.	Gun Position. Heavy Guns.	Second-ary.	Armament. Guns. B.L.R. are of Russian Krupp pattern.	Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	Admiral Makaroff	7887	443	75¾	23	19,000 B.	La Seyne	1906	1908		6¾–4 K.S.	2	3 K.S.	6¾ K.S.	5¾ K.S.	3 K.S.	2 *8-in.*, 8 *6-in.*, 20 *12-pr.*, 4 *6-pr.*, 6 l. and M.	2 sub.	22·5 *t*	750 / 1020	573
b.	Alexander III (Imperator), B.S.	22,500	551¼	89½	27¼	25,000 tur.	Nikolaieff (Ivanoff)	Bldg.	..	..	12 K.S.	3	8 K.S.	..	12 K.S.	5 K.S.	12 *12-in.*, 20 *5-in.*	4 sub.	21·0	3000	..
b.	Andrei Pervozvannyi	17,200	429¾	79¾	28½	17,600 B.	St. Petersburg (Galerny)	1906	1910	1,170,000	11–6 K.S.	2½	5 K.S.	..	12 K.S.	7 K.S.	4 *12-in.*, 14 *8-in.*, 12 *4·7-in.*, 14 smaller	3 sub.	18·0	1500	933
a.c.	Bayan	7887	443	75¾	23	16,500 B.	St. Petersburg (New Admiralty)	1907	1910	..	6¾–4 K.S.	2	3 K.S.	6¾ K.S.	5¾ K.S.	3 K.S.	2 *8-in.*, 8 *6-in.*, 20 *12-pr.*, 4 *6-pr.*, 6 l. and M.	2 sub.	21·0	750 / 1020	573
b.	Cesarevitch	12,912	388¾	76¼	26½	16,300 B.	La Seyne	1901	1903	..	9¾–4 K.S.	2½	6 K.S.	9 K.S.	10–11 K.S.	6¾ K.S.	4 *12-in.*, 12 *6-in.*, 20 *3-in.*, 6 *1·4-in.*, 4 M., 2 l.	2 sub.	19·6 *t*	900 / 1350	732
b.	Ekaterina II, B.S.	22,500	551¼	89½	27¼	25,000 tur.	Nikolaieff (Belgian Co.)	Bldg.	..	..	12 K.S.	3	8 K.S.	..	12 K.S.	5 K.S.	12 *12-in.*, 20 *5-in.*	4 sub.	21·0	3000	..
b.	Evstafi (Sviatoi), B.S.	12,733	372¼	72¾	27	10,600 B.	Nicolaieff	1906	1911	..	9–3 K.S.	2½	6 K.S.	7–5 K.S.	10 K.S.	5 K.S.	4 *12-in.*, 4 *8-in.*, 12 *6-in.*, 14 *3-in.*, 10 smaller, 6 M., 2 l.	3 sub.	16	670 / 1400	731
b.	Gangut	23,000	590½	87	27¼	42,000 Y. tur.	St. Petersburg (New Admiralty)	1911	..	..	11–4 K.S.	3	8 K.S.	4 K.S.	11½ K.S.	5 K.S.	12 *12-in.*, 16 *4·7-in.*, 4 *3-pr.*, 8 M.	4 sub.	23	1200 / 3000	..
b.	Georgi Pobiedonosetz B.S.	11,032	320	69	26½	10,600 13,468 *t*	Sebastopol	1892	1896	431,000	16–11	..	12	..	12	..	6 *12-in.*, 7 *6-in.*, 8 *3·9-in.*, 12 smaller Q.F. and M.	7	16·5 *t*	500 / 855	656
a.c.	Gromoboi shd.	13,220	473	68½	26	14,500	St. Petersburg (Baltic)	1899	1900	..	6 H.S.	3	4¾ H.S.	6 H.S.	6 H.S.	4¾ H.S.	4 *8-in.*, 22 *6-in.*, 20 *3-in.*, 11 small Q.F. and M.	4 4 sub.	20·0	2500	814

b.	**Ioann Zlatoust**, B.S.	12,733	372¼	72¾	27	10,600 B.	Sebastopol	1906	1910	..	9–3 K.S.	2½	6 K.S.	7–5 K.S.	12–10 K.S.	5 K.S.	4 *12-in.*, 4 *8-in.*, 12 *6-in.*, 14 *3-in.*, 10 smaller, 6 M., 2 l.	5	16·0	670† 1400	636
a.g.b.	**Khrabry**	1735	229	41¾	11	3000 Nic.	St. Petersburg (New Admiralty)	1895	1896	..	5	1½	..	3½	..	..	2 *8-in.*, 8 Q.F.	2	15·0	100	120
b.	**Maria** (Imperatritsa), B.S.	22,500	551¼	89½	27¼	25,000 tur.	Nicolaieff (Ivanoff)	Bldg.	..	..	12 K.S.	3	8 K.S.	..	12 K.S.	5 K.S.	12 *12-in.*, 20 *5-in.*	4 sub.	21·0	3000	..
a.c.	**Pallada**	7900	443	75¾	23	16,500 B.	St. Petersburg (New Admiralty)	1906	1910	..	6¾–4 K.S.	2	3 K.S.	6¾ K.S.	5¾ K.S.	3 K.S.	2 *8-in.*, 8 *6-in.*, 20 *12-pr.*, 4 *6-pr.*	5 sub.	21·0	750 1020	573
b.	**Panteleimon**, B.S. (*ex* Potemkine)	12,582	372¼	72¾	27	10,600 B.	Nicolaieff	1900	1902	..	9–3 K.S.	2½	6 K.S.	7–5 K.S.	12–10 K.S.	5 K.S.	4 *12-in.*, 16 *6-in.*, 14 *3-in.*, 14 *1·4-in.*	5 sub.	17·0	670†	636
b.	**Pavel I** (Imperator)	17,200	429¾	79¾	28½	17,600 B.	St. Petersburg (Baltic)	1907	1911	1,170,000	11–6 K.S.	2½	5 K.S.	..	12 K.S.	7 K.S.	4 *12-in.*, 14 *8-in.*, 12 *4·7-in.*, 14 smaller.	5 sub.	18·0	1500	933
b.	**Petropavlovsk**	23,000	590½	87	27¼	42,000 Y. tur.	St. Petersburg (Baltic)	1911	..	2,800,000	11–4 K.S.	3	8 K.S.	4 K.S.	11½ K.S.	5 K.S.	12 *12-in.*, 16 *4·7-in.*, 4 *3-pr.*, 8 M.	4 sub.	23·0	1200 3000	...
b.	**Poltava**						St. Petersburg (New Admiralty)	1911	..	2,800,000											
a.c.	**Rossia** shd.	12,130	480	68½	26	14,500 B.	St. Petersburg	1896	1897	..	10–5 H.S.	2½	4 H.S.	6 H.S.	2 H.S.	2 H.S.	4 *8-in.*, 22 *6-in.*, 19 smaller Q.F. & M.	2	20·0	2500 §	725
b.	**Rostislav**, B.S.	8880	341	66½	24	8700	Nicolaieff	1896	1900	..	15¾–8 H.S.	2–3	5 H.S.	5 H.S.	15¾ H.S.	6 H.S.	4 *10-in.*, 8 *6-in.*, 16 small & M.	6	16·0	§550 800	624
a.c.	**Rurik**	15,170	490	75	26	19,700 B.	Barrow	1906	1907	..	6–3 K.S.	1½	3 K.S.	3 K.S.	8 K.S.	7 K.S.	4 *10-in.*, 8 *8-in.*, 20 *4·7-in.*, 12 smaller.	2 sub.	21·0	1200 2000	800
b.	**Sevastopol**	23,000	590½	87	27¼	42,000 Y. tur.	St. Petersburg (Baltic)	1911	..	2,800,000	11–4 K.S.	2	8 K.S.	4 K.S.	11½ K.S.	5 K.S.	12 *12-in.*, 16 *4·7-in.*, 4 *3-pr.*, 8 M.	4 sub.	23·0	1200 3000	...
b.	**Sinope**, B.S.	10,180	331	69	26½	13,000 B.	Sebastopol	1887	1890	900,000	16–11 *comp.*	3	14 *comp.*	12	14 *comp.*	..	6 *12-in.*, 7 *6-in.*, 8 Q.F., 6 M.	7	16·75	886	325
b.	**Slava**	13,516	367½	76	26	16,000 B.	St. Petersburg (Baltic)	1903	1905	..	9–4 K.S.	4	6 K.S.	9 K.S.	10 K.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 20 *3-in.*, 20 *3-pr.*, 6 *1-pr.*	2 sub.	18·0	1250 2000	740
b.	**Tria Sviatitelia**, B.S.	13,318	357½	72¼	27	10,600	Nicolaieff	1893	1897	..	16 H.S.	3	16 H.S.	12 H.S.	16 H.S.	5 H.S.	4 *12-in.*, 14 *6-in.*, 50 smaller Q.F. & M.	6 2 sub.	18·0 *t*	1000	582

† And liquid fuel, 580 tons ‡ Exclusive of armament. § And liquid fuel.

Four battle-cruisers of 30,000 tons, with a main armament of 14-in. guns, 70,000 H.P. Yarrow boilers, have been laid down, the Borodino and Navarin at Galerny Island and Ismail and Kinburn at the Baltic yard.

RUSSIA.—Cruising Ships, &c.

(B.S., Black Sea Fleet.)

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	ins.				knots.	tons.	
to.g.b.	**Abrek**	535	212¼	24¾	9	4506 *t*	Abo	1896	1897	53,600	½	..	2 *3-in.*, 4 *1·8-in.*	2	21·2 *t*	..	..
3rd cl. *cr.*	**Almaz**	3285	325	43½	17½	7500 B.	St. Petersburg (Baltic)	1903	1904	..	2¾	5–3½ K.S.	3 *4·7-in.*, 8 *1·8-in.*, 2 *1·4-in.*, 2 M.	6	19·0	560	340
2nd cl. *cr.*	**Askold**	5905	426½	49¼	20¾	24,000 T.S.	Kiel (Germania)	1900	1901	..	3	4	12 *6-in.*, 12 *3-in.*, 6 *1·8-in.*, 8 smaller Q.F. and M.	6 (2 sub.)	23·8 *t*	720 / 1100	500
„ „	**Aurora**	6731	413¼	55¾	21	11,610 B.	St. Petersburg (Galerny)	1900	1903	..	2½	..	8 *6-in.*, 20 *3-in.*, 14 smaller Q.F. and M.	3 (2 sub.)	20·0	900 / 1400	422
g.b.	**Bobr**	875	215¼	35¾	9	800	St. Petersburg (New Admiralty)	1907	1908	..	..	..	2 *4·7-in.*, 4 *12-pr.*, 3 M.	1	12·0	60	170
2nd cl. *cr.*	**Bogatyr**	6645	416¾	54½	20¾	20,300 Nor.	Stettin (Vulcan)	1901	1902	..	2	5 N.S.	12 *6-in.*, 12 *3-in.*, 6 *1·8-in.*, 8 smaller Q.F. and M.	4 (2 sub.)	24·0 *t*	720 / 1100	580
„ „	**Diana** (Training-ship)	6630	413¼	55¾	21	11,610 B.	St. Petersburg (Galerny)	1899	1902	..	2½	..	10 *6-in.*, 20 *3-in.*, 18 smaller Q.F. and M.	3 (2 sub.)	20·0	900 / 1400	422
g.b.	**Gilyak**	875	215¼	35¾	9	800	St. Petersburg (New Admiralty)	1906	1908	..	..	..	2 *4·7-in.*, 4 *12-pr.*, 3 M.	1	12·0	60	170
3rd cl. *cr.*	**Jemchug**	3106	347¾	41½	16	17,000 Y	St. Petersburg (Nevsky)	1903	1904	..	2	..	8 *4·7-in.*, 6 *1·8-in.*, 5 smaller Q.F. and M.	3	23·0	600	340
„ „	**Kagul**, B.S. (ex-Otchakoff)	6675	439	54½	20½	19,500 Nor.	Sebastopol	1902	1905	..	2¾	5–3½ K.S.	12 *6-in.*, 12 *3-in.*, 14 smaller	2 sub.	23·0	720 / 1100	570
to.g.b.	**Kazarsky**, B.S.	400	190	24	8½	3500	Elbing	1890	1891	32,500	..	..	9 *1·8-in.* (Hotchkiss)	2	23·0	90	60
g.b.	**Koreiets**	875	215¼	35¾	9	800	St. Petersburg (New Admiralty)	1906	1908	..	..	..	2 *4·7-in.*, 4 *12-pr.*, 3 M.	1	12·0	60	170

2nd cl. *cr.**.	**Oleg**	6675	439¾	54½	20½	19,500 Nor.	St. Petersburg (New Admiralty	1903	1904	..	2¾	5–3½	12 *6-in.*, 12 *3-in.*, 14 smaller, Q.F., & M.	2 (sub.)	23·0	600	310
" " *.	**Pamyat Mercuria**, B.S. (ex-Kagul) .	6675	439	54½	20½	19,500	Nicolaieff .	1903	1907	..	2¾	5–3½ K.S.	12 *6-in.*, 12 *3-in.*, 14 smaller, Q.F., & M.	2 (sub.)	23·0	720	..
to.g.b. .	**Posadnik** . . .	394	192½	24¼	7½	3600	Elbing . .	1892	1894	111,000	..	..	2 *1·8-in.*, 7 *1·4-in.*, 3 M.	2	22·0	90	87
g.b. . .	**Sivoutch** . . .	875	215¼	35¾	9	800	St. Petersburg. (New Admiralty)	1906	1908	..	..	..	2 *4·7-in.*, 4 *12-pr.*, 3 M. .	..	12·0	60	170
to.g.b. .	**Voevoda** . . .	415	192½	24¼	7½	3600	Elbing . .	1892	1893	111,000	..	..	2 *1·8-in.*, 7 *1·4-in.*, 3 M.	2	22·0	90	87

Okean, *coal transport*, 12,000 tons, 18 knots, launched at Kiel, 1901. Torpedo transports and mining vessels **Minin**, General Admiral, Gerzog Edinburgski, Volga, **Bakan**, **Yenessei**, **Amur**, Ladoga, **Narova**, Onega and Prut. Eight river **gunboats** (946 tons) building for the Amur, **Grosa**, Shkwol, Shtorm, Taifun, Smertsh, Uragan, Vichrj, Vjuga. **Gunboats** for the Caspian, **Kars** and **Ardagan**, completed 1911. Rynda (1885), 3508 tons, training ship. A submarine salvage vessel is in hand for the Baltic.

Volunteer Fleet.—**Saratoff**, 8556 reg. tons, Petersburg, 9252 reg. tons, Kherson, 10,225 reg. tons, Don, 8430 reg. tons, **Kuban**, 8480 reg. tons, **Smolensk**, 11,850 reg. tons, **Terek**, 7241 reg. tons, all of 18½ or greater speed. Vessels of the Black Sea Shipping Company are available for transport purposes.

Six cruisers of 6500 tons are to be built—four of them for the Baltic at the Putiloff Yard and Reval, and two for the Black Sea at Nicolaieff; also for the Baltic two 27·5 knot cruisers of 4500 tons, which have been ordered from Schichau.

SPAIN.—Armoured Ships.

Class	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	**Alfonso XIII.**	15,460	435	78¾	25½	15,300Y. P. tur.	Ferrol	Bldg.	..	..	9–4 K.S.	2–1	6–5 K.S.	6–3 K.S.	10 K.S.	6 K.	8 *12-in.*, 20 *4-in.*, 2 *3-pr.*, 2 l., 2 M.	3	19·5	800 1900	700
a.c.	**Cataluña**	6889	347¾	61	21¾	15,000	Cartagena	1900	1903	600,000	12–10	2	..	12	10½	..	2 *9·4-in.*, 8 *5·5-in.*, 8 *6-pr.*, 2 l.	5 sub.	19·5 *t*	1200	484
”	**Emperador Carlos V**	9089	380	67	25	18,500	Cadiz (Vea Murguia)	1895	1898	734,000	2	6½–2	2	..	10	2	2 *11-in.* (Hontoria), 8 *5·5-in.*, 4 *3·9-in.*, 2 *2·7-in.*, 4 *2·2-in.*, 6 M.	6	20·0	1200	535
b. *b.*	**España** **Jaime I.**	15,460	435	78¾	25½	15,300Y. P. tur.	Ferrol	1912 Bldg.	..	..	9–4 K.S.	2–1	6–5 K.S.	6–3 K.S.	10 K.S.	6 K.	8 *12-in.*, 20 *4-in.*, 2 *3-pr.*, 2 l., 2 M.	3	19·5	800 1900	700
b.	**Pelayo**	9744	330	66	25	9000 Nic.	La Seyne	1887	1890 1897	..	17¾	4	..	..	19½	4 H.S.	2 *12·5-in.*, 2 *11-in.*, 9 *5·5-in.*, 6 smaller, 12 M.	7	16·0	800	600
a.c.	**Princesa de Asturias**	6889	347¾	61	21¾	15,000	Carraca	1896	1902	600,000	12–10	2	..	12	10½	..	2 *9·4-in.*, 10 *5·5-in.*, 8 *6-pr.*, 2 l.	5	18·0	1200	500

SPAIN.—Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	ins.				knots.	tons.	
g.b.	Bonifaz	800	200	30	..	1100 Y	Cartagena	Bldg.	..	..	..	..	4 *3-in.*, 2 M.	..	13·0	..	..
to.g.b.	Don Alvaro de Bazán	810	233	26¾	22	2500	Ferrol	1897	1899	..	..	..	2 *4·7-in.* (Hontoria), 4 *1·6-in.*, 2 M.	4	19·0	..	110
„	Doña María de Molina	810	233	26¾	22	2500	Ferrol	1896	1898								
cr.	Extremadura	2030	290	36	14	7000 T	Cadiz	1900	1902	..	2	..	8 *4-in.* (Vickers), 4 *2·2-in.*, 2 *1·4-in.*, 1 l.	..	20·0	430	246
g.b.	Lauria	800	200	30	..	1100 Y	Cartagena	Bldg.	..	..	..	..	4 *3-in.*, 2 M.	..	13·0	..	..
„	Laya							Bldg.	..								
cr.	Lepanto	4750	318½	50½	20	12,000	Cartagena	1892	1895	..	4¾	..	4 *7·8-in.* (Hontoria), 6 *4·7-in.*, 6 *6-pr.*, 4 *3-pr.*, 5 M.	5	20·0	1100	276
to.g.b.	Marqués de la Victoria	810	233	26¾	22	2500	Ferrol	1897	1900	..	..	..	2 *4·7-in.* (Hontoria), 4 *1·6-in.*, 2 M.	4	19·0	..	110
g.v.	Marqués de Molíns	562	190	23	10¼	2600	Ferrol	1891	1893	..	..	..	2 *4·7-in.* (Hontoria), 4 *2·2-in.*, 1 M.	2	12·0	106	80
„	Martin Alonso Pinzón							1892	1893								
g.b.	Recalde	800	200	30	..	1100 Y	Cartagena	1911	1912	..	..	..	4 *3-in.*, 2 M.	..	13·0	..	..
cr.	Reina Regente	5287	337	529	19¾	6500 W.T.	Ferrol	1906	1908	..	..	3	10 *5·5-in.*, 12 *2·2-in.*, 2 l., 8 M.	3	20·0	1200	497
„	Rio de la Plata . shd.	1773	246	35¼	15	7100 N.S.	Havre	1898	1899	..	..	1	2 *5·5-in.*, 4 *3 9-in.*, 4 *2·2-in.*, 6 M.	2	20·0	270	213
g.v.	Vincente Yáñez Pinzón	562	190	23	10¼	2600	Ferrol	1891	1892	..	..	..	2 *4·7-in.* (Hontoria), 4 *2·2-in.*, 1 M.	2	12·0	106	80

Hernán Cortés, Vasco Nuñez de Balboa, Ponce de Léon, MacMahon, Perla, Destructor, Nueva España and Temerario, gunboats.

SWEDEN.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Second-ary.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
c.d.s., t.	**Aeran**	3612	287	49¼	16½	6500 Y.	Gothenburg	1901	1902	..	7 K.S.	1⅞	..	..	7½ K.S.	5 K.S.	2 *8·2-in.*, 6 *5·9-in.*, 10 *2·2-in.*, 2 *1·4-in.*, 2 M.	2 sub.	17·2 *t*	370	250
„	**Dristigheten**	3445	285	48½	16	5400 Y	Gothenburg	1900	1901	..	8 K.S.	1⅞	..	..	8 N.S.	3¾ K.S.	2 *8·2-in.*, 6 *5·9-in.*, 10 *2·2-in.*, 2 M.	2 sub.	16·5	300	250
a.c.	**Fylgia**	4100	377¼	48¾	16	12,440 Y. *t*	Stockholm	1905	1907	385,700	4 K.S.	2	..	..	5 K.S.	..	8 *5·9-in.*, 14 *2·2-in.*, 3 *1·4-in.*	2	22·5 *t*	350 / 900	321
c.d.s., t.	**Göta**	3238	258½	48	16¾	4750	Gothenburg	1890 1902	1891	.	11¾–8	2	..	..	7½ H.S.	5 H.S.	1 *8·2-in.*, 7 *5·9-in.*, 11 *2·2-in.*, 2 *1·4-in.*	3	16·0	240	150
„	**Manligheten**	3612	287	49¼	16½	7400 Y.	Malmö	1904	1906	..	7 K.S.	1⅞	..	..	7½ K.S.	5 K.S.	2 *8·2-in.*, 6 *5·9-in.*, 10 *2·2-in.*, 2 *1·4-in.*, 2 M.	2 sub.	17·0	370	250
„	**Njord**	3445	278¼	48½	17½	5350	Gothenburg	1898	1899	..	9½ H.N.S.	1⅞	..	..	9⅞ H.N.S.	4 H.N.S.	2 *9·8-in.*, 6 *4·7-in.*, 10 *2·2-in.*, 4 M.	1	16·5	275	200
„	**Oden**	3445	278¼	48½	17½	5330	Stockholm	1896	1898	..	9½ H.N.S.	1⅞	..	..	9⅞ H.N.S.	4 H.N.S.	2 *9·8-in.*, 4 *4·7-in.*, 10 *2·2-in.*, 4 M.	1	16·5	275	200
„	**Oscar II**	4203	313¾	49½	16¾	8500 Y.	Gothenburg	1905	1907	..	6 K.S.	2	6 K.S.	6 K.S.	7½ K.S.	5 K.S.	2 *8·2-in.*, 8 *5·9-in.*, 10 *2·2-in.*, 2 *1·4-in.*, 2 M.	2 sub.	18·0	350 / 500	326
„	**Svea**	3051	248¼	49¼	17	3640	Gothenburg	1886 1904	1887	..	11¾–8	2	..	..	7½ H.S.	5 H.S	1 *8·2-in.*, 7 *5·9-in.*, 11 *2·2-in.*, 2 *1·4-in.*	1	14·7 *t*	220	268
„	**Sverige**	[illegible]100	390½	61	21½	20,000 tur. Y.	Stockholm	Bldg.	..	666,000	8–6 K.S.	1½	4 K.S.	..	8 K.S.	5 K.S.	4 *11-in.*, 8 *6-in.*, 6 *12-pr.*, 4 *1-pr.*	2 sub.	22·0	350 / 800	450
„	**Tapperheten**	3612	287¼	49¼	16½	6000 Y.	Malmö	1901	1904	..	7 K.S.	1⅞	..	..	7½ K.S.	5 K.S.	2 *8·2-in.*, 6 *5·9-in.*, 10 *2·2-in.*, 2 *1·4-in.*, 2 M.	2 sub.	16·5	370	250
„	**Thor**	3445	278¼	48½	17½	5350	Stockholm	1898	1890	..	9½ H.N.S.	1⅞	..	..	9⅞ H.N.S.	3¾ H.N.S.	2 *9·8-in.*, 6 *4·7-in.*, 10 *2·2-in.*, 4 M.	1	16·5	275	200
„	**Thule**	3248	260¾	48	16¾	4740	Stockholm	1892 1904	1894	..	11¾–8	1⅞	..	..	7½ H.S.	5 H.S.	1 *8·2-in.*, 7 *5·9-in.*, 11 *2·2-in.*, 2 *1·4-in.*	2	16·2 *t*	250	165
„	**Wasa**	3612	287	49¼	16½	6000 Y.	Stockholm	1901	1893	..	7 K.S.	1⅞	..	..	7½ K.S.	5 K.S.	2 *8·2-in.*, 6 *5·9-in.*, 10 *2·2-in.*, 2 *1·4-in.*, 2 M.	2 sub.	16·5	370	250

SWEDEN.—Cruising Ships, &c.

Class.	NAME	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour: Deck.	Armour: Gun Position.	Armament: Guns.	Armament: Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.										knots.	tons.	
to.g.b.	Claes Horn	787	222	27	10¼	3600	Stockholm	1899	1900	..	..	..	2 4·7-*in.*, 4 2·2-*in.*	1 sub.	20·0	120	110
„	Claes Uggla	787	232	27½	8¾	4500 Y.	Stockholm	1900	1901	..	..	..	2 4·7-*in.*, 4 2·2-*in.*	1	20·5	120	110
to.g.b.	Jacob Bagge	787	222	27	10¼	3970	Malmö	1898	1899	..	..	..	2 4·7-*in.*, 4 2·2-*in.*	1 sub.	19·5	120	110
	Örnen					4100	Gothenburg	1896	1897						19·5		
„	Psilander	787	232	27½	8¾	4500 Y.	Stockholm	1900	1901	..	..	..	2 4·7-*in.*, 4 2·2-*in.*	1 sub.	20·5 *t*	120	110

Four gunboats of 190 to 200 tons, and about 130 I.H.P. each, and carrying 1 5-in. B.L.R. and 2 M.

TURKEY.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draugh	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
c.b.	**Assar-i-Tewfik**	4613	272½	52½	25	3560	La Seyne	1868	1870 1906	..	8	..	..	..	6	..	3 *5·9-in.*, 7 *4·7-in.*, 6 *6-pr.*	..	13·0	400	300
b.	**Kheyr-ed-Din Barbarossa** *	9901	354¼	65	24¾	9000	Wilhelmshaven	1891	1894	450,000	15¾ comp.	2½	..	..	11¾ comp.	1½	6 *11-in.*, 8 *4·1-in.*, 8 *3·4-in.*, 4 M.	3	17·0	630 / 1000	..
b.	**Messoudieh**	9120	331½	59	25¾	11,000 Nic.	Thames Genoa	1874	1876 1901	..	12	1	12	..	6–9	12	2 *9·2-in.*, 12 *6-in.*, 14 *3-in.*, 10 *6-pr.*, 2 *3-pr.*, 2 l.	..	17·5 t	1100	600
b. b.	**Reshad-i-Hamiss** **Reshad V.**	23,000	525	91	..	31,000 P. tur.	Barrow Elswick	Bldg.	..	..	12–6 K.S.	3	9–8 K.S.	12 K.S.	12 K.S.	5 K.S.	10 *13·5-in.*, 16 *6-in.*	5 sub.	21·0	..	..
b.	**Turgut Reis** †	9901	354¼	65	24¾	9000	Stettin (Vulcan)	1891	1893	450,000	15¾ comp.	2½	..	..	11¾ comp.	1½	6 *11-in.*, 8 *4·1-in.*, 8 *3·4-in.*, 4 M.	3	17·0	630 / 1000	..

* Ex Kurfürst Friedrich Wilhelm. † Ex Weissenburg.

Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
to. cr.	**Berk-i-Satvet**	740	262½	27½	..	5100	Kiel (Germania)	1906	1907	..	..	..	2 *4-in.*, 6 *6-pr.*, 2 M., 2 l.	3	22	240	..
cr.	**Hamidieh**	3800	340	47½	16	12,500 Nic.	Elswick	1903	1904	..	4–1½	..	2 *6-in.*, 8 *4·7-in.*, 6 *1·8-in.*, 6 M.	2	22·2 t	600	300
to. cr.	**Heibetnuma**	1960	226	37	14	2500 ind.	Turkey	1890	1893	..	..	..	3 *5·9-in.* (K.), 6 *4·7-in.*, 6 Q.F.	2	14·0	..	..
g.v.	**Lutfi-Hamayoun**	1313	210	35	14	2800	Turkey	1892	1894	..	..	..	4 *6-in.* (K.), 6 *4·7-in.*, 6 Q.F.	2	13·0	..	..
cr.	**Medjidieh**	3432	331½	42	16	12,000 Nic.	Philadelphia	1903	1904	..	4–1½	..	2 *6-in.*, 8 *4·7-in.*, 6 *1·8-in.*, 6 M.	2	22·2	600	300
to. cr.	**Peik-i-Shevket**	740	262½	27½	..	5100	Kiel (Germania)	1906	1907	..	..	..	2 *4-in.*, 6 *6-pr.*, 2 M., 2 l.	3	22	240	..
„	**Pelenk-i-deria**	840	236½	31	16½	5000	Kiel (Germania)	1890	1891	..	..	½	2 *4-in.* (K.), 16 M.	2	20·0	..	111

Seven gunboats (510–420 tons) built and building in France (1912). Mine-layer Nusrat, 380 tons, 15 knots, launched Germania Yard, Kiel, 1912.

UNITED STATES.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost. *	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
t.	Alabama.	11,565	368	72¼	26	11,207 t	Philadelphia	1898	1900	544,539	16½–4 H.S.	2¾–4	5¼ H.S.	12 H.S.	15 H.S.	6 H.S.	4 13-in., 14 6-in., 16 6-pr., 2 1-pr., 4 M., 2 l.	..	17·0 t	800 / 1275	592
b.	Arkansas	26,000	554	93¼	28½	28,000 P. tur.	Camden, N.J.	1911	1912	964,000	11–5 K.S.	3	..	8–6 K.S.	11 K.S	6½	12 12-in., 21 5-in., 4 3-pr., 2 M., 2 l.	2 (sub.)	21·0 t	1650 / 2500	1115
a. c.	Brooklyn.	9215	400½	62	26¼	18,425 t	Philadelphia	1895	1896	613,583	3 H.S.	6–3	4 H.S.	..	8 H.S.	5½ H.S.	8 8-in., 12 5-in., 12 6-pr., 4 1-pr., 4 M., 2 l.	..	22·2 t	900 / 1622	718
,,	California	13,680	502	69½	24½	29,381 t B. & W.	S. Francisco.	1904	1907	756,000	6–3½ K.S.	4	5 K.S.	4 K.S.	6 K.S.	5 K.S.	4 8-in., 14 6-in., 18 3-in., 12 3-pr., 8 1-pr., 8 M., 2 l.	2 (sub.)	22·2 t	900 / 2000	829
,,	Charleston	9700	424	66	25½	27,200 B.&W.	Newport News	1904	1906	563,030	4 H.S.	3	4 H.S.	..	4 H.S.	..	14 6-in., 18 3-in., 12 3-pr., 12 1-pr., 10 M., 2 l.	..	22·0	650 / 1500	664
,,	Colorado.	13,680	502	69½	24½	26,837 Nic.	Philadelphia	1903	1905	756,000	6–3½ K.S.	4	5 K.S.	4 K.S.	6 K.S.	5 K.S.	4 8-in., 14 6-in., 18 3-in., 12 3-pr., 8 1-pr., 8 M., 2 l.	2 (sub.)	22·2 t	900 / 2000	829
b.	Connecticut	16,000	450	76¾	26¾	20,525 B. & W.	Camden, N.J.	1904	1906	819,300	11½ K.S.	3	8 K.S.	7 K.S.	10 K.S.	7 K.S.	4 12-in., 8 8-in., 12 7-in., 20 3-in., 12 3-pr., 8 1-pr., 8 M., 2 l.	4 (sub.)	18·8 t	900 / 2200	803
b.	Delaware	20,000	510	85¼	27	29,025	Newport News	1909	1910	817,300	11 K.S.	..	10–8 K.S.	..	11 K.S.	5 K.S.	10 12-in., 14 5-in., 2 3-pr., 2 l., 12 M.	2 (sub.)	21·5 t	1000 / 2500	927
b.	Florida	21,825	510	88¼	27	28,000 tur.	New York	1910	1911	1,280,000	11	..	10	..	11	5	10 12-in., 16 5-in., 4 3-pr., 4 M., 2 l.	2 (sub.)	21·0	1000 / 2300	1014
Super-posed turrets.	Georgia	14,948	435	76¼	23¾ †	25,088 t Nic.	Bath, Me.	1904	1906	737,700	11–4 K.S.	3	6 K.S.	6 K.S.	11 K.S.	6 K.S.	4 12-in., 8 8-in., 12 6-in., 12 3-in., 12 3-pr., 8 1-pr., 8 M., 2 l.	4 (sub.)	19·2 t	900 / 1704	812
b.	Idaho	13,000	375	77	25	14,235 B. & W.	Philadelphia	1905	1908	616,360	9–4 K.S.	3–1½	7 K.S.	7 K.S.	10–7½ K.S.	6 K.S.	4 12-in., 8 8-in., 8 7-in., 12 3-in., 6 3-pr., 4 1-pr., 8 M., 2 l.	2 (sub.)	17·2 t	600 / 1750	725
b.	Illinois	11,565	368	72¼	26	12,757	Newport News	1898	1901	533,237	16½–4 H.S.	2¾–4	5¼ H.S.	12 H.S.	15 H.S.	6 H.S.	4 13-in., 14 6-in., 16 6-pr., 6 1-pr., 4 M., 2 l.	1 (sub.)	17·45 t	800 / 1275	686
b.	Indiana	10,288	348	69¼	27¼	9,607 B. & W.	Philadelphia	1893	1895	620,569	18 H.S.	2¾	5 H.S.	17 H.S.	17 H.S.	10 H.S.	4 13-in., 8 8-in., 12 3-in., 4 6-pr., 2 M., 1 l.	..	15·5 t	400 / 1567	497

* The sums given in this column are exclusive of the cost of armour and armament according to the system of making appropriations in the estimates.

† Mean draught.

UNITED STATES.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost. *	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b	Iowa	11,340	360	72¼	26¾	11,933	Philadelphia	1896	1897	618,514	14 H.S.	2¾	5 H.S.	12 H.S.	15 H.S.	8–6 H.S.	4 *12-in.*, 8 *8-in.*, 10 *4-in.*, 4 *6-pr.*, 6 M., 2 l.	..	17·1 *t*	625 / 1795	520
,,	Kansas	16,000	450	77	26¾	19,545 B. & W.	Camden, N.J.	1905	1907	855,850	8–11 K.S.	3–4½	8 K.S.	7 K.S.	10 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *7-in.*, 20 *3-in.*, 12 *3-pr.*, 8 *1-pr*, 8 M., 2 l.	4 (sub.)	18·1 *t*	900 / 2200	854
super-posed turrets	{Kearsarge / Kentucky}	11,540	368	72¼	25¾	{11,788 / 12,179}	Newport News	1898	1899	462,345 each	16½–4 H.S.	2¾–5	5½ H.S.	..	15 H.S.	9 H.S.	4 *13-in.*, 4 *8-in.*, 18 *5-in.*, 10 small L. and M.	{1 / ..}	{16·8 / 16·9} *t*	410 / 1591	{690 / 686}
b.	Louisiana	16,000	450	76¾	26¾	20,748 B. & W.	Newport News.	1904	1906	819,300	11–8 K.S.	3	8 K.S.	7 K.S.	10 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *7-in.*, 20 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 L.	4	18·8 *t*	900 / 2200	803
,,	Maine	12,300	388	72¼	25½	15,693 Nic.	Philadelphia	1901	1902	592,828	11–4 K.S.	2¾–4	6 K.S.	10 K.S.	12 K.S	6 K.S.	4 *12-in.*, 16 *6-in.*, 6 *3-in.*, 8 *3-pr.*, 6 *1-pr.*, 2 M., 2 l.	2 sub.	18·0 *t*	1000 / 1800	551
a.c.	Maryland	13,680	502	69½	24½	28,059 B. & W.	Newport News.	1903	1905	756,400	6–3½ K.S.	4	5 K.S.	4 K.S.	6 K.S.	5 K.S.	4 *8-in.*, 14 *6-in.*, 18 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	2 sub.	22·4 *t*	900 / 1850	829
b.	Massachusetts	10,288	348	69¼	27⅓	10,240	Philadelphia	1893	1896	620,569	18 H.S.	2¾	5 H.S.	17 H.S.	17 H.S.	10–5 H.S.	4 *13-in.*, 8 *8-in.*, 12 *3-in.*, 4 *6-pr.*, 2 M., 2 l.	..	16·2 *t*	400 / 1560	509
,,	Michigan	16,000	450	80¼	24½	16,310 B. & W.	Camden, N.J.	1908	1909	700,000	11–9	3	8	10	10–8	8	8 *12-in.*, 22 *3-in.*, 2 *3-pr.*, 12 M., 2 l.	2 sub.	18·8 *t*	900 / 2200	669
a.c.	Milwaukee	9700	424	66	25½	24,166 W.T.	S. Francisco.	1904	1906	580,500	4 H.N.S.	3	4 H.N.S.	..	4 H.N.S.	..	14 *6-in.*, 18 *14-pr.*, 12 *3-pr.*, 12 *1-pr.*, 10 M., 2 l.	2 sub.	22·2 *t*	650 / 1500	664
b.	Minnesota	16,000	450	77	26¾	20,235 B. & W.	Newport News	1905	1907	844,500	8–11 K.S.	3–4½	8 K.S.	7 K.S.	10 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *7-in.*, 20 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 sub.	18·8 *t*	900 / 2200	881
,,	Mississippi	13,000	375	77	24¾	13,607 B. & W.	Philadelphia	1905	1908	616,360	9–4 K.S.	3–1½	7 K.S.	7 K.S.	10–7½ K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 8 *7-in.*, 12 *3-in.*, 6 *3-pr.*, 4 *1-pr.*, 8 M., 2 l.	2 sub.	17·11 *t*	600 / 1750	725
,,	Missouri	12,300	388	72¼	25½	15,845 T.	Newport News	1901	1903	592,828	12–4 K.S.	2¾–4	6 K.S.	10 K.S.	12 K.S.	6 K.S.	4 *12-in.*, 16 *6-in.*, 6 *3-in.*, 8 *3-pr.*, 4 *1-pr.*, 2 M., 2 l.	2 sub.	18·1 *t*	1000 / 1836	551
a.c.	Montana	14,500	502	72¾	25	27,938 B. & W.	Newport News	1906	1908	970,630‡	5–3 K.S.	3	5 K.S.	6 K.S.	9 K.S.	5 K.S.	4 *10-in.*, 16 *6-in.*, 22 *3-in.*, 12 *3-pr.*, 4 *1-pr.*, 4 M., 2 l.	4 sub.	22·2 *t*	900 / 2000	845
c.d.s., t.	Monterey	4084	256	59	15¼	5244 B. & W.	S. Francisco.	1891	1893	345,731	13–6 H.S.	3	..	..	13 H.S.	..	2 *12-in.*, 2 *10-in.*, 6 *6-pr.*, 4 *1-pr.*, 2 M.	..	13·6 *t*	200 / 233	218

Superposed turrets.	**Nebraska** .	14,948	435	76¼	23¾ †	21,283 B. & W.	Seattle .	1904	1907	767,213	11–4 K.S.	3	6 K.S.	6 K.S.	11 K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 12 *6-in.*, 12 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 sub.	19·1 *t*	900 1900	812
b.	**Nevada** .	27,500	575	95	28½	35,000 Cur. tur.	Quincy, Mass.	Bldg.	..	2,200,000	13½–8 K.S.	1½–3	13½–8 K.S.	13½ K.S.	18–16 K.S.	5 K.S.	10 *14-in.*, 21 *5-in.*, 10 small l. & M.	4 sub.	20·5 *t*	1300 2000	..
b.	**NewHampshire**	16,000	450	77	26¾	19,100 B. & W.	Camden, N.J.	1906	1908	1,600,000 (Total)	9–4 K.S.	3	7 K.S.	7 K.S.	12 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *7-in.*, 12 *3-in.*, 12 *3-pr.*, 4 *1-pr.*, 4 M., 2 l.	4 sub.	18·2 *t*	900 2350	916
Superposed turrets.	**New Jersey** .	14,948	435	76¼	23¾ †	23,089 B. & W.	Quincy, Mass.	1904	1906	699,680	11–4 K.S.	3	6 K.S.	6 K.S.	11 K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 12 *6-in.*, 12 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 sub.	19·4 *t*	900 1900	812
b.	**New York** .	27,000	573	95¼	28½ †	35,000	New York .	1912	..	..	12–4 K.S.	3	9 K.S.	10 K.S.	14–8 K.S.	6 K.S.	10 *14-in.*, 20 *5-in.*, 10 small l. & M.	4 sub.	21·0	2200 2850	1014
a.c.	**North Carolina**	14,500	502	72¾	25	29,785 B. & W.	Newport News	1906	1908	970,630‡	5–3 K.S.	3	5 K.S.	9 K.S.	9 K.S.	5 K.S.	4 *10-in.*, 16 *6-in.*, 22 *3-in.*, 12 *3-pr.*, 4 *1-pr.*, 4 M., 2 l.	4 sub.	22·48 *t*	900 2000	845
b.	**North Dakota** .	20,000	510	85	27	31,400 Cur. tur.	Quincy, Mass.	1908	1910	899,500	11 K.S.	..	10–8 K.S.	..	11 K.S.	5 K.S.	10 *12-in.*, 14 *5-in.*, 2 *3-pr.*, 2 l., 12 M.	2 sub.	21·6 *t*	1000 2500	960
b.	**Ohio** . .	12,440	388	72¼	25½	16,220 T.	S. Francisco.	1901	1904	595,705	11·4 K.S.	3–4	6 K.S.	10 K.S.	12 K.S.	6 K.S.	4 *12-in.*, 16 *6-in.*, 6 *3-in.*, 8 *3-pr.*, 6 *1-pr.*, 2 M., 2 l.	2 sub.	17·8 *t*	1000 2144	521
b.	**Oklahoma** .	27,500	575	95	28½	35,000	New York .	Bldg.	..	2,200,000	13½–8 K.S.	1½–3	13½–8 K.S.	13½ K.S.	18–16 K.S.	5 K.S.	10 *14-in.*, 22 *5-in.*, 10 small l. & M.	4 sub.	21·0	1300 2000	..
b.	**Oregon** .	10,288	348	69¼	27¼	11,037	S. Francisco.	1893	1896	653,447	18 H.S.	2¾	5 H.S.	17 H.S.	17 H.S.	10–5 H.S.	4 *13-in.*, 8 *8-in.*, 20 *6-pr.*, 2 *1-pr.*, 4 M.	..	16·8 *t*	400 1594	500
b.	**Pennsylvania** .	31,400	600	97	28¾	..	Newport News	Bldg.	..	1,520,000	..	..	..	..	.	..	12 *14-in.*, 22 *5-in.*	4 sub.	..	..	..
a.c.	**Pittsburg** .	13,680	502	69½	24½	28,600 Nic.	Philadelphia	1903	1905	799,340	6–3½ K.S.	4	5 K.S.	4 K.S.	6 K.S.	5 K.S.	4 *8-in.*, 14 *6-in.*, 18 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	2 sub.	22·4 *t*	900 2000	829
c.d.s. (2 t.)	**Puritan** . .	6060	290¼	60	18½	3,700	Chester .	1882 reblt.	1896	..	14–6 H.S.	2	..	..	14 H.S.	..	4 *12-in.*, 6 *4-in.*, 6 *6-pr.*, 2 *1-pr.*, 4 M.	..	12·4 *t*	307	230
Superposed	**Rhode Island** .	14,948	435	76¼	23¾ †	20,310 B. & W.	Quincy, Mass.	1904	1906	699,680	11–4 K.S.	3	6 K.S.	6 K.S.	11 K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 12 *6-in.*, 12 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 sub.	19·0 *t*	900 1900	812
a.c.	**Saratoga** .	8200	380½	64¾	27½	17,075	Philadelphia	1891	1893 1909	613,377	4 H.S.	2½	.. K.S.	..	6½ H.S.	5–4 H.S.	4 *8-in.*, 10 *5-in.*, 8 *12-pr.*, 4 *3-pr.*, 4 M.	..	21·0 *t*	750 1334	498
a.c.	**St. Louis** .	9700	424	66	25½	27,264 B. & W.	Philadelphia (Cramp)	1905	1906	563,030	4 K.S.	3	4–3	..	4 K.S.	..	14 *6-in.*, 18 *14-pr.*, 12 *3-pr.*, 12 *1-pr.*, 10 M., 2 l.	..	22·3 *t*	650 1500	664
b.	**South Carolina**	16,000	450	80¼	24½	18,357 B. & W.	Philadelphia (Cramp)	1908	1909	700,000	11–9	3	8	10	10–8	8	8 *12-in.*, 22 *3-in.*, 2 *3-pr.*, 12 M., 2 l.	2 sub.	18·9 *t*	900 2200	669

* See note on page 275. † Mean draught. ‡ Including armour, but not armament.

UNITED STATES.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost. *	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Secondary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
		tons.	ft.	ft.	ft.						in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	**South Dakota** .	13,680	502	69½	24½	28,598 B. & W.	S. Francisco.	1904	1907	770,570	6–3½ K.S.	4	5 K.S.	4 K.S.	6 K.S.	5 K.S.	4 *8-in.*, 14 *6-in.*, 18 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	2 sub.	22·0 *t*	900 / 2000	829
a.c.	**Tennessee** .	14,500	502	72¾	25	26,963 B. & W.	Philadelphia	1904	1906	970,630‡	5–3 K.S.	3	5 K.S.	6 K.S.	9 K.S.	5 K.S.	4 *10-in.*, 16 *6-in.*, 22 *3-in.*, 12 *3-pr.*, 4 *1-pr.*, 8 M., 2 l.	4 sub.	22·1 *t*	900 / 2000	858
b.	**Texas** .	27,000	573	95¼	28½	35,000	Newport News	1912	..	1,166,000	12–4 K.S.	3	9 K.S.	10 K.S.	14–8 K.S.	6 K.S.	10 *14-in.*, 20 *5-in.*, 10 small	4 sub.	21·0	2200 / 2850	1014
b.	**Utah** .	21,825	510	88¼	28½	28,477 *t.*, P. tur.	Camden, N.J.	1909	1911	813,500	11	..	10	..	11	5	10 *12-in.*, 16 *5-in.*, 4 *3-pr.*, 4 M., 2 l.	2 sub.	21·6 *t*	1000 / 2300	1014
t.	**Vermont** .	16,000	450	77	26¾	17,982 B. & W.	Quincy, Mass.	1905	1907	858,730	8–11 K.S.	3–4½	8 K.S.	7 K.S.	10 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *7-in.*, 20 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 sub.	18·33 *t*	900 / 2200	854
Super-posed	**Virginia** .	14,948	435	76¼	23¾ †	22,841 Nic.	Newport News	1904	1906	737,700	11–8 K.S.	3	6 K.S.	6 K.S.	11 K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 12 *6-in.*, 12 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 sub.	19·0 *t*	900 / 1900	812
a.c.	**Washington** .	14,500	502	72¾	27	27,152 B. & W.	Camden, N.J.	1905	1906	970,630‡	5–3 K.S.	3	5 K.S.	6 K.S.	9 K.S.	5 K.S.	4 *10-in.*, 16 *6-in.*, 22 *3-in.*, 12 *3-pr.*, 4 *1-pr.*, 8 M., 2 l.	4 sub.	22·3 *t*	900 / 2000	858
,,	**West Virginia**	13,680	502	69½	24½	26,135 B. & W.	Newport News	1903	1905	798,310	6–3½ K.S.	4	5 K.S.	12 H.S.	6 K.S.	5 K.S.	4 *8-in.*, 14 *6-in.*, 18 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	2 sub.	22·1 *t*	900 / 2000	829
t.	**Wisconsin** .	11,653	368	72¼	26	12,452	S. Francisco.	1898	1901	549,666	16½–4 H.S.	3–4	5½ H.S.	..	15 H.S.	6 H.S.	4 *13-in.*, 14 *6-in.*, 16 *6-pr.*, 6 *1-pr.*, 4 M., 2 l.	1	17·2 *t*	800 / 1310	583
b.	**Wyoming** .	26,000	554	93¼	28½	28,000 P. tur.	Philadelphia	1911	1912	963,800	11–9 K.S.	..	..	8–6 K.S.	11 K.S.	8	12 *12-in.*, 21 *5-in.*, 4 *3-pr.*, 2 M., 2 l.	2 sub.	21·2 *t*	1650 / 2500	1115

Also the monitors Amphitrite, Miantonomoh, Monadnock, and Terror, 3990 tons, Tonopah (*ex* Nevada), 3714 tons, Talahasse (*ex* Florida) and Ozark (*ex* Arkansas), 3235 tons, Cheyenne (*ex* Wyoming), 3218 tons, and the second-class battleship Texas, 6315 tons.

* See note on page 275. † Mean draught. ‡ Including armour, but not armament.

UNITED STATES.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost. *	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
3rd cl. *cr.*	**Albany** . shd.	3487	345	43¾	20	7500	Elswick .	·1899	1900	247,611	3	3–1¼ shields	10 *5-in.*, 10 *3-pr.*, 12 *1-pr.*, 2 M., 1 l.	..	20·5 *t*	512 / 747	356
scout .	**Birmingham** .	3750	420	46¾	17	15,670 Express	Quincy, Mass.	1907	1908	301,000	2–1½	..	2 *5-in.*, 6 *3-in.*	2 sub.	24·3 *t*	1250	356
cr. .	**Chattanooga** shd..	3200	292	44	16¾	5303 B.&W.	Elizabeth Port	1903	1904	212,325	2	..	10 *5-in.*, 8 *6-pr.*, 2 *1-pr.*, 4 M., 1 l.	..	16·65 *t*	470 / 700	302
scout .	**Chester** .	3750	420	46¾	17	16,000 Nor. turb.	Bath, Me. .	1907	1908	337,000	2–1½	..	2 *5-in.*, 6 *3-in.*	2 sub.	26·5 *t*	1250	356
,, ,,	**Cincinnati** .	3213	300	42	20¼	8,490 B.&W.	Brooklyn .	1892	1894	226,055	2½	4	11 *5-in.*, 8 *6-pr.*, 2 *1-pr.*, 2 M.	..	19·0	350 / 468	314
cr. .	**Cleveland** . shd..	3200	292	44	16¾	4640 B.&W.	Bath, Me. .	1901	1903	212,325	2	..	10 *5-in.*, 8 *6-pr.*, 2 *1-pr.*, 4 M., 1 l.	..	16·4 *t*	470 / 700	302
2nd cl. *cr.*	**Columbia** .	7375	412	58¼	25½	18,509	Philadelphia	1892	1894	559,950	4–2½	4 shield	1 *8-in.*, 2 *6-in.*, 8 *4-in.*, 12 *6-pr.*, 2 *1-pr.*, 2 M., 1 l.	..	22·8 *t*	750 / 1670	477
3rd cl. *cr.* ,,	**Denver** . **Des Moines** } shd.	3200	292	44	16¾	4135 B. & W.	Philadelphia, Quincy, Mass.	1902	1904	212,325	2	..	10 *5-in.*, 8 *6-pr.*, 2 *1-pr.*, 4 M., 1 l.	..	16·75	470 / 700	303
,,	**Dubuque** .	1085	174	35	13	1193 B. & W.	Morris Heights, N.Y.	1904	1905	..	..	..	6 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 2 M.	..	12·9	200	162
cr.	**Galveston** . shd.	3200	292	44	16¾	5073 B. & W.	Richmond, Va.	1903	1904	212,325	2	..	10 *5-in.*, 8 *6-pr.*, 2 *1-pr.*, 4 M., 1 l.	..	16·4	470 / 700	302
g.v.	**Helena** .	1392	250¾	40	10	1988	Newport News	1896	1897	57,536	½	2¼	8 *4-in.*, 4 *6-pr.*, 4 *1-pr.*, 2 M.	..	15·5 *t*	106 / 300	256
g.b.	**Marietta** .	1000	174	34	13½	1054 B.&W.	S. Francisco.	1896	1897	45,823	..	..	6 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 1 M.	..	13·2 *t*	100 / 239	140

* Prices exclusive of armament.

UNITED STATES.—Cruising Ships, &c.—*continued*.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost. *	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
2nd cl. *cr.*	**Minneapolis** .	7375	412	58¼	25½	20,862	Philadelphia	1893	1894	552,754	4–2½	4 shield	1 *8-in.*, 2 *6-in.*, 8 *4-in.*, 12 *6-pr.*, 2 *1-pr.*, 2 M., 1 l.	..	23·0 t	750 / 1200	477
g.v.	**Nashville** . .	1371	220	38	12	2536 C. & Y.	Newport News	1895	1897	57,536	½	..	8 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 2 M.	..	16·7 t	150 / 400	176
3rd cl. *cr.*	**New Orleans** shd.	3487	346	43¾	19¾	7500	Elswick .	1896	1898;	293,684	..	3–1¼ shields	10 *5-in.*, 10 *3-pr.*, 2 *1-pr.*, 2 M., 1 l.	..	20·0	512 / 767	366
g.v.	**Paducah** . .	1085	174	35	13	1000 B.& W.	Morris Heights, N.Y.	1904	1905	..	..	..	6 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 2 M.	..	12·0	200	162
g.b.	**Princeton** . .	1000	168	36	12½	923	Camden .	1897	1898	47,262	..	..	6 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 1 M. .	..	12·0	100 / 238	135
3rd cl. *cr.*	**Raleigh** . .	3213	300	42	20¼	8500 B.&W.	Norfolk .	1892	1894	226,055	2½	4	11 *5-in.*, 8 *6-pr.*, 2 *1-pr.*, 2 M., 1 l.	..	19·0	350 / 460	313
scout	**Salem** . . .	3750	420	46¾	18¼	22,242 W.T. turb.	Quincy, Mass.	1907	1908	301,000	2–1½	..	2 *5-in.*, 6 *3-in.* . . .	2 sub.	25·9 t	1250	356
3rd cl. *cr.*	**Tacoma** . shd.	3200	292	44	16¾	5288 B.& W.	S. Francisco.	1903	1904	212,325	..	2 shields	10 *5-in.*, 8 *6-pr.*, 2 *1-pr.*, 4 M., 1 l.	..	16·6 t	470 / 700	302
g.v.	**Vicksburg** . .	1000	168	36	12½	1118	Bath, Me. .	1896	1898	47,406	..	..	6 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 1 M.	..	12·7 t	100 / 239	135
"	**Wheeling** . .	1000	174	34	12½	1080	S. Francisco.	1897	1897	65,540	..	..	6 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 1 M.	..	12·9 t	120 / 226	140
"	**Wilmington** .	1392	250¾	40	10	1894	Newport News	1895	1897	57,536	1	2½	8 *4-in.*, 4 *6-pr.*, 4 *1-pr.*, 4 M.	..	15·0 t	100 / 300	175

Third class cruisers Baltimore, Atalanta, Newark, and San Francisco, the last named converted into a mine-layer. Fleet colliers Prometheus, Erie, Ontario and Vestal (12,500 tons); Cyclops, Jason, Jupiter, Neptune, Nereus, Orion and Proteus, 1935 tons. Two large oil-transports, Kanawha and Maumee, are to be built. Gunboat, Sacramento, 1500 tons, 15 knots, is completing. Torpedo depôt Castine, 1177 tons.

Training ships, Olympia, 5870 tons; Chicago, 4500 tons; Marblehead, 2089 tons. Torpedo experimental vessel, Montgomery, 2089 tons.

The ocean liners St. Louis and St. Paul, 11,629 tons, New York and Philadelphia, 10,802 tons, 20 knots (International Navigation Co.), and the Korea and Siberia, 11,200 tons, 18 knots (Pacific Mail Steamship Co.) are enrolled auxiliary cruisers. The Niagara, submarine tender, is in hand.

* Prices exclusive of armament.

SHIPS BELONGING TO POWERS WHOSE NAVIES ARE OF LESSER IMPORTANCE.

Bulgaria.—Eleven steamers of small size, of which one is used as the Prince's yacht. Two armoured gunboats for the Danube built at Leghorn. The Nadiezda, despatch vessel (715 tons), launched Bordeaux, 1898; 18·85 knots; 2600 I.H.P.; Lagrafel-d'Allest boilers; armament, 2 3·9-in., 3 1·8-in. Q.F., and 2 torpedo tubes. Three 100-ton 26-knot torpedo-boats launched 1907; three smaller.

Colombia.—Cruiser Almirante Lezo (*ex* El Baschir), 1200 tons; 2500 H.P.; 18 knots; built 1892, bought from Morocco. Gunboats, Chercuito and Bogota. River gunboats, General Nerino and Esperanza, 400 tons. Three Yarrow motor gunboats, 1913.

Cuba.—Cruiser Cuba, 2055 tons, 3500 H.P., 18 knots, and gunboat Patria, 1200 tons, 1500 H.P., 16 knots.

Ecuador.—The torpedo cruiser Almirante Simpson, 812 tons, bought from Chili. One torpedo-boat and two transport vessels.

Egypt.—The Nile stern-wheel gunboats Sultan, Sheikh and Melik, 140 tons, Fateh and Naseh, 128 tons; also the Abu Klea, Hafir, Metemmeh, and Tamai.

Hayti.—Steel gunboat—Capois la Mort, 260 tons, 1 3·9-in., and 4 1-pr. Q.F. Iron corvette—Dessalines, 1200 tons, armed with 1 3·9-in. Q.F., 2 3·9-in. B.L., 2 l., 2 M. Two sloops—St. Michael and 1804. Gun-vessel, 22nd of December. The gunboat Liberté was blown up and destroyed, with a loss of 70 lives. It is stated that the Italian cruiser Umbria, 2245 tons, has been bought.

Mexico.—Two gun-vessels, Tampico and Vera Cruz, launched Elizabethport, New Jersey, 1902; displacement, 980 tons; armament, 4 4-in. Q.F., 6 6-pr.; bow torpedo tube; 2400 I.H.P.; speed, 16 knots; fitted to serve as transport for 200 troops. Gun vessels Bravo and Morero, 1200 tons; 2600 I.H.P.; Blechynden boilers; 17 knots; launched Leghorn, 1904. The Zaragoza, 1200 tons, 1300 H.P., 15 knots speed, and armed with 4 4·7-in. guns and 4 small quick-firing guns. Gun-vessel, Democrata, 450 tons; 11 knots; 2 6½-in. muzzle-loaders and 2 small guns. Torpedo transport General Guerrero, 1880 tons; 1200 I.H.P.; completed at Barrow 1908. Two small gunboats of 10 knots speed. Five torpedo-boats. Two cruisers, 2400 tons, to be built.

Peru.—Almirante Grau and Coronel Bolognesi, cruisers, 3200 tons; 370 ft. long, 40 ft. 6 in. beam, 14 ft. 3 in. draught; Barrow,

1906; 2 6-in., 8 14-pdr., 8 1¼-pdr.; 2 submerged torpedo tubes; 1½-in. armoured deck, 3-in. conning tower; 14,000 I.H.P.; 24 knots. Eclaireur, cruiser, 1769 tons, launched 1877, partially reconstructed; bought from France. Armoured cruiser Dupuy de Lôme, purchased for £140,000, and renamed Elias Aguirre. Lima, 1700 tons, 1800 I.H.P., 16 knots; armament, 2 6-in. guns. Destroyer, Rodriguez, 500 tons, and submarines, Ferré and Palacios, built Le Creusot, 1912–13. Screw steamer, Santa Rosa, about 400 tons.

Roumania.—Elizabeta, protected cruiser (deck 3 in.), built in 1887 at Elswick; 230 ft. long, 32 ft. 10 in. beam; 1320 tons; 3000 I.H.P.; armament, 4 5·9-in. B.L.R., 4 Q.F., 2 M., 4 torpedo tubes. Composite gunboat Mircea, 360 tons; Grivitza, 110 tons. Two gunboats, 45 tons, and 3 first-class torpedo-boats. For the Danube, the gunboats Fulgurul, Oltul, Siretul, Bistritza, 90 to 100 tons, Alexandru cel Bun, 104 tons, 5 sloops, 2 small torpedo-boats. The shipbuilding programme includes 8 monitors of 600 tons (of which four are to be built, 1913), 12 torpedo-boats and 8 vedettes for the Danube, and 6 coast-defence vessels of 3500 tons, 4 destroyers of 300 tons, and 12 torpedo-boats for the Black Sea. Four monitors (3 4·7-in. guns) and 3 torpedo-boats completed.

Santo Domingo.—The Independencia, built in England 1894, 170 ft. long, 25 ft. broad, displacement 322 tons, and armed with seven Hotchkiss quick-firing guns. Restauracion, steel gun-vessel, 1000 tons, launched at Glasgow in 1896. The 14-knot cruiser Presidente has been reconstructed, and carries seven guns.

Sarawak.—Two gunboats, of 175 and 118 tons respectively, of low speed, each armed with two guns.

Siam.—Deck-protected cruiser, Maha Chakrkri, 290 ft. long, 39 ft. 4 in. beam, of 2500 tons displacement and 17 to 18 knots speed; armament, four 4·7-in. and ten 6-pdr. quick-firing guns. Makut-Rajakamar, 650 tons. The gunboats Bali, Muratha, and Sugrib, 600 tons, one 4·7-in. Q.F., five 2·2 in., four 1·4 in., 12 knots, launched 1898 and 1901. Several other gunboats. Three modern despatch vessels 100 to 250 tons. Three 380-ton, 27-knot destroyers, built at Kobe.

Uruguay.—Gunboats: General Artigas, 274 tons, 12½ knots speed, 2 4·7-in. (Krupp), 2 M.; and General Saurez, 300 tons. The cruiser Uruguay, built at the Vulcan Yard, Stettin; 1100 tons; 2 4·7-in., 4 12-pdr., 12 Maxims; 2 18-in. torpedo tubes; 5700 I.H.P.; 23 knots.

Venezuela.—Gunboats Bolivar, 571 tons, 18·6 knots, and Miranda, 200 tons, 12 knots; transports Restaurador, 568 tons, and Zamora, 350 tons. Maresa Sucre (ex Isla de Cuba), drill ship, bought from United States, 1912.

BRITISH AND FOREIGN FLOTILLAS.

Great Britain.

Name or Number.	Built by.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Mean Speed on Trial, or expected.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
Great Britain. TORPEDO-BOAT DESTROYERS.			Feet	Feet.	Feet.		Tons.		Knots.				Tons.
†Boxer	Thornycroft	1894	201·6	19	7·3	2	265	4,500	29·17	1–12 pr. 5–6 prs.	2	45	60
†Bruizer	,,	1895	201·6	19	7·3	2	265	4,500	27·97	1–12 pr. 5–6 prs.	1	45	60
Conflict	White	1894	205·6	20	..	2	320	4,370	27·21	1–12 pr. 5–6 prs.	2	50	60
Fervent	Hanna	1895	200	19	7·8	2	275	3,800	[27]	1–12 pr. 5–6 prs.	1	50	70
Lightning	Palmer	1895	200	19·7	6·5	2	275	4,007	27·94	1–12 pr. 5–6 prs.	2	50	60
Opossum	Hawthorn	1895	200	19	5·2	2	295	4,052	28·24	1–12 pr. 5–6 prs.	1	50	60
Porcupine	Palmer	1895	200	19·7	6·5	2	275	3,866	27·91	1–12 pr. 5–6 prs.	2	50	60
Ranger	Hawthorn	1895	200	19	5·2	2	295	3,900	27·13	1–12 pr. 5–6 prs.	1	50	60
Sunfish	Hawthorn	1895	200	19	5·2	2	295	4,292	27·62	1–12 pr. 5–6 prs.	1	50	60
Surly	Thomson	1894	205·6	19·5	5·25	2	280	4,400	28·05	1–12 pr. 5–6 prs.	2	50	50
Wizard	White	1895	200	19·5	5·2	2	320	4,400	[27]	1–12 pr. 5–6 prs.	2	45	60
Zephyr	Hanna	1895	200	1[illegible]	5·3	2	275	3,850	[27]	1–12 pr. 5–6 prs.	1	50	60
†Albatross	Thornycroft	1898	227·6	21·25	8·5	2	430	7,900	31·5	1–12 pr. 5–6 prs.	2	68	100
†Angler	,,	1897	210	19·6	7·1	2	310	5,800	30·37	1–12 pr. 5–6 prs.	2	60	80
Arab	Brown & Co.	1901	218	20·0	5·6	2	470	6,000	31	1–12 pr. 5–6 prs.	2	60	80
†Avon	Vickers	1896	210·6	21·6	5·6	2	355	6,000	30	1–12 pr. 5–6 prs.	2	60	80
Bat	Palmer	1896	215	20·75	6·8	2	360	6,185	30·1	1–12 pr. 5–6 prs.	2	60	91
†Bittern	Vickers	1897	210·6	21·6	5·6	2	355	6,000	30	1–12 pr. 5–6 prs.	2	60	80
Brazen	Brown & Co.	1896	218	20·0	5·6	2	3[illegible]5	6,000	30	1-12 pr. 5-6 prs.	2	60	80
†Bullfinch	Earle's Co.	1898	210	20·6	5·8	2	345	5,800	30	1–12 pr. 5–6 prs.	2	60	80
†Cheerful	Hawthorn	1897	210	21·0	8	2	355	6,000	30	1–12 pr. 5–6 prs.	2	62	82
†Coquette	Thornycroft	1897	210	19·5	7·2	2	335	5,800	30·21	1–12 pr. 5–6 prs.	2	60	80
Crane	Palmer	1896	215	20·7	6·8	2	360	6,336	30·3	1–12 pr. 5–6 prs.	2	60	80
†Cygnet	Thornycroft	1898	210	19·5	7·2	2	335	5,800	30·3	1–12 pr. 5–6 prs.	2	60	80
†Cynthia	,,	1898	210	19·5	7·2	2	355	5,800	30·2	1–12 pr. 5–6 prs.	2	60	80
†Desperate	,,	1896	210	19·6	7·2	2	310	5,800	30	1–12 pr. 5–6 prs.	2	60	80
†Dove	Earle's Co.	1898	210·0	20·6	5·8	2	345	5,800	30	1–12 pr. 5–6 prs.	2	60	80
Earnest	Laird	1896	210·6	21·7	5·3	2	355	6,000	30·13	1–12 pr. 5–6 prs.	2	58	80
Electra	Brown & Co.	1896	218	20·0	5·6	2	3[illegible]0	6,000	30	1–12 pr. 5–6 prs.	2	58	80
Express	Laird	1897	227 6	22·0	9	2	465	9,000	31	1–12 pr. 5–6 prs.	2	60	80
Fairy	Fairfield	1897	227·6	22·0	9	2	355	6,000	30	1–12 pr, 5–6 prs.	2	60	80
†Falcon	,,	1899	220	21·3	9	2	375	6,000	30	1–12 pr. 5–6 prs.	2	60	80
†Fame	Thornycroft	1896	210·6	19·6	7·1	2	310	5,800	30·16	1-12 pr. 5 6 prs.	2	60	80
Fawn	Palmer	1897	215	20·7	6·8	2	360	6,581	30·5	1-12 pr 5–6 prs.	2	60	91
Flirt	,,	1897	215	20·7	6·8	2	360	6,682	30	1–12 pr. 5–6 prs.	2	60	91
Flying Fish	,,	1897	215	20·7	6·8	2	360	6,416	30·4	1–12 pr. 5–6 prs.	2	58	91
†Foam	Thornycroft	1896	210	19·6	7·1	2	3[illegible]0	5,800	30·18	1–12 pr. 5-6 prs.	2	58	80
Gipsy	Fairfield	1897	227·6	22·0	9	2	355	6,000	30	1–12 pr. 5–6 prs.	2	60	80
Greyhound	Hawthorn	1900	210	21	8·6	2	385	6,000	30	1–12 pr. 5–6 prs.	2	60	90
Griffon	Laird	1896	210·0	20	5·3	2	355	6,000	30·11	1-12 pr. 5-6 prs.	2	58	80
Kestrel	Brown & Co.	1898	218	20·0	5 6	2	350	6,000	30	1–12 pr. 5–6 prs.	2	60	80
Kangaroo	Palmer	1900	215	20·75	6·8	2	370	6,500	30	1–12 pr. 5–6 prs.	2	60	91
Leopard	Vickers	1897	210	20·0	5·6	2	350	6,000	30	1–12 pr. 5–6 prs.	2	60	80
Leven	Fairfield	1898	218 0	20·0	5·6	2	370	6,000	30	1–12 pr. 5–6 prs.	2	58	80
Lively	Laird	1900	218	20·0	5 6	2	385	6,000	30	1–12 pr. 5–6 prs.	2	58	80
Locust	,,	1896	210	21·7	5·3	2	355	6,000	30·16	1–12 pr. 5–6 prs.	2	58	80
†Mallard	Thornycroft	1896	210·6	19·6	7·1	2	310	5,800	30·11	1–12 pr. 5–6 prs.	2	60	80
Mermaid	Hawthorn	1898	210	21 0	8	2	355	6,000	30	1–12 pr. 5–6 prs.	2	60	82
Myrmidon	Palmer	1900	215	20·75	6·8	2	370	6,500	30	1–12 pr. 5–6 prs.	2	62	91
Orwell	Laird	1898	218·0	20·0	5·6	2	360	6,000	30	1–12 pr. 5–6 prs.	2	58	80
Osprey	Fairfield	1897	227·6	22·0	9	2	355	6,000	30	1–12 pr. 5–6 prs.	2	60	80
†Ostrich	,,	1900	210	21·0	9	2	375	6,000	30	1–12 pr. 5–6 prs.	2	60	80
Otter	Vickers	1896	210	20·0	5·6	2	350	6,000	30	1–12 pr. 5–6 prs.	2	60	80
Panther	Laird	1897	210·6	21·7	5·3	2	355	6,000	30·14	1–12 pr. 5–6 prs.	2	58	80
Peterel	Palmer	1899	215	20·8	..	2	370	6,200	30	1 12 pr. 5-6 prs.	2	62	85
Quail	Laird	1895	213·6	21·6	5·3	2	355	6,000	30·38	1–12 pr. 5–6 prs.	2	58	90
Racehorse	Hawthorn	1900	210	21	8·6	2	385	6,000	30	1–12 pr. 5–6 prs.	2	60	90
Recruit	Brown & Co.	1896	218·0	20·0	5·6	2	350	6,000	30	1–12 pr. 5–6 prs.	2	58	90
Roebuck	Hawthorn	1901	210	21	8·6	2	385	6,000	30	1–12 pr. 5–6 prs.	2	60	90
Seal	Laird	1897	218·0	20·0	5·6	2	355	6,000	30·15	1–12 pr. 5–6 prs.	2	58	80
Spiteful	Palmer	1899	215	20·75	6·8	2	365	6,500	30·1	1–12 pr. 5–6 prs.	2	62	81

All Jarrow-built destroyers have Reed's boilers. † Thornycroft W.T. boilers.

Great Britain—*continued.*

Name or Number.	Built by.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Mean Speed on Trial, or expected.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
TORPEDO-BOAT DESTROYERS.			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Sprightly	Laird	1900	218	20·0	5·6	2	385	6,000	30	1–12 pr. 5–6 prs.	2	58	80
†Stag	Thornycroft	1900	210	19·75	7·2	2	320	5,800	30 34	1–12 pr. 5–6 prs.	2	60	80
Star	Palmer	1896	215	20·75	6·88	2	360	6,266	30·7	1–12 pr. 5–6 prs.	2	58	91
Success	Doxford	1901	210·0	21·0	9·2¾	2	380	6,000	30	1–12 pr. 5–6 prs.	2	62	43
†Sylvia	,,	1897	210	19·9	7·6	2	350	5,400	30	1–12 pr. 5–6 prs.	2	58	80
Syren	Palmer	1900	215	20·75	6·8	2	390	6,500	30	1–12 pr. 5–6 prs.	2	..	91
Taku	Schichau	1898	193·6	20	5	2	305	6,500	32	6–3 pr. Q.	3	..	67
Thorn	Brown & Co.	1900	210	21	5·5	2	380	6,000	30	1–12 pr. 5–6 prs.	2	58	80
Thrasher	Laird	1895	210·6	21·7	5·3	2	355	6,000	30·13	1–12 pr. 5–6 prs.	2	58	80
Vigilant	Brown & Co.	1900	210	21	5·5	2	380	6,000	30	1–12 pr. 5–6 prs.	2	58	80
†Violet	Doxford	1897	210	20·75	6·88	2	350	5,400	30	1–12 pr. 5–6 prs.	2	58	80
Virago	Laird	1895	210·6	21·7	5·3	2	355	6,000	30·13	1–12 pr. 5–6 prs.	2	58	80
*a*Vixen	Vickers	1900	210·0	20·0	5·8	2	400	6,000	30	1–12 pr. 5–6 prs.	2	62	88
Vulture	Brown & Co.	1898	218	20	5·6	2	345	6,000	30	1–12 pr. 5–6 prs.	2	58	80
Whiting	Palmer	1896	215	20·75	6·88	2	360	6,239	30·2	1–12 pr. 5 6 prs.	2	58	91
Wolf	Laird	1897	218	20	5·6	2	355	6,000	30	1–12 pr. 5–6 prs.	2	58	80
Derwent	Hawthorn	1904	220	23	10	2	534	7,000	25·68		2	70	130
‡Eden	,,	1903	220	23	8¾	6	527	7,000	26·22		2	70	130
Exe	Palmer	,,	225	23½	10	2	540	7,000	25·64		2	70	127
Ribble	Yarrow	1904	225	23½	10	2	550	7,500	26		2	70	120
Itchen	Laird	1903	225	23½	10	2	550	7,000	25·64		2	70	130
Usk	Yarrow	,,	225	23½	10	2	550	7,500	26		2	70	120
Teviot	Yarrow	,,	225	23½	10	2	550	7,500	26		2	70	120
Ettrick	Palmer	,,	225	23½	10	2	540	7,000	25·56	4–12 prs.	2	70	127
Foyle	Laird	,,	225	23½	10	2	550	7,000	25·65		2	70	120
Erne	Palmer	,,	225	23½	10	2	540	7,000	25·6		2	70	127
Arun	Laird	,,	225	23½	10	2	550	7,000	25·72		2	70	130
Cherwell	Palmer	,,	225	23½	10	2	540	7,000	25·6		2	70	127
Dee	Palmer	,,	225	23½	10	2	540	7,000	25·5		2	70	127
Jed	Thornycroft	1904	222	23½	9·6	2	640	7,500	25·78		2	70	126
Kennet	,,	1903	222	23½	9·6	2	640	7,500	25·99		2	70	126
‡Velox	Parsons	1902	210	23	8¼	8	440	8,000	27	1–12 pr. 5–6 prs.	2	63	130
Waveney	Hawthorn	1903	220	23½	10	2	534	7,000	25·62	4–12 prs.	2	70	130
Welland	Yarrow	1904	225	23½	10	2	550	7,500	26		2	70	120
Chelmer	Thornycroft	1904							25·7				
Boyne	Hawthorn	1904							25·72				
Colne	Thornycroft	1905							25·57				
Doon	Hawthorn	1904							25·8				
Garry	Yarrow	1905							26·5				
Kale	Hawthorn	1904							25·74				
Rother	Palmer	1904							25·51				
Liffey	Laird	1904	222	23½	9·6	2	600	7,500	25·51	4–12 prs.	2	72	95/126
Moy	,,	1904							25·6				
Ness	White	1905							25·62				
Nith	,,	1905							25·69				
Ouse	Laird	1905							25 56				
Swale	Palmer	1905							25·59				
Ure	Palmer	1904							25 65				
Wear	Palmer	1905							25·62				

† Thornycroft W.T. boilers. ‡ Hulls and Yarrow boilers of these vessels by Hawthorn Leslie & Co.
a Has four Express W.T. boilers.

Great Britain—*continued.*

Name or Number.	Built by.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal or Oil.
OCEAN-GOING DESTROYERS.			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
‡*Afridi	Armstrong	1907	250	25	8·5	3	872	14,250	32·75				92½e
‡*Cossack	Cammell Laird	1907	270	26	9·3	3	890	14,0(0	33·15				78
‡*Ghurka	Hawthorn	1907	255	25·7	9·3	3	880	14,250	34	5–12-prs.	2	60	98
¶*Mohawk	White	1907	270	25	8·10	3	865	14,500	34·51				74
†*Tartar	Thornycroft	1907	270	26	9·1	3	870	14,500	35·67				76
¶*Saracen	White	1908	272	26	9·5	3	980	15,500	33·8	2·4-in. B.L.	2	67	84e
†*Amazon	Thornycroft	1908	280	26½	9·2	3	970		33·73				86e
¶*Crusader	White	1909	280	26	9·8	3	1045	15,500	35				99e
‡*Maori	Denny	1909	280	27	8·8	3	1035	15,500	33				103e
†*Nubian	Thornycroft	1909	280	26½	9·1	3	985	15,500	34·88	2·4-in. B.L.	2	71	97½e
‡*Viking	Palmer	1909	280	27·3	8·7	3	1090	15,500	..				102½e
‡*Zulu	Hawthorn	1909	280	27	8·9	3	1027	15,500	34				94e
§Albacore	Palmer *b*	1908	215	21	7	..	440	6,000	26 75	3–12 prs.	2	43½	..
§Bonetta													
¶§Basilisk	White	1910	275	28			984		27·98				
‡§Beagle	John Brown	1909	269	26·7			940		27·12				
‡§Bulldog	,,	1909	269	26·7			940		27·4				
‡§Foxhound	,,	1909	269	26·7			940		27·7				
‡§Grasshopper	Fairfield	1909	271	27¾			890		27·04				
¶§Harpy	White	1909	275	28			984		27·75				
‡§Mosquito	Fairfield	1910	271	27¾	8·6	3	890	12,500	27·12	1·4 in., 3–12 prs.	2	96	120e
‡§Nautilus	Thames Ironworks	1910	267½	28			964		28·1				
‡§Pincher	Denny	1910	271¾	28½			940		27·17				
‡§Racoon	Cammell Laird	1910	266	28			920		27·07				
‡§Rattlesnake	Lond. & Glasgow Co.	1910	270¼	27½			938		27·03				
‡§Renard	Cammell Laird	1909	266	28			920		27·14				
‡§Savage	Thornycroft	1910	264	28	9·3	3	885		27·16				
‡§Scorpion	Fairfield	1910	271	27·9	..	3	890	12,500	27·1	1·4-in., 3–12 prs.	2	96	..
‡§Scourge	Hawthorn	1910	266¾	28	8·6	3	925		27·06				
‡§Wolverine	Cammell Laird	1910	266	28	..	3	920		27·1				
‡§Stour	Cammell Laird *c*	1909	220	23·9	7·11	..	566	7,000	25·58	4-12-prs.	2	..	66½
‡§Test									25·62				
‡*Acorn		1910							27·22				
‡*Alarm	John Brown	1910							27·2				
‡*Brisk		1910							27·6				
‡*Cameleon		1910							28·03				
‡*Comet	Fairfield	1910							27·9				
‡*Goldfinch		1910							28				
‡*Fury	Inglis	1911							27·3				
‡*Hope	Swan, Hunter	1910							27·1				
‡*Larne		1910							28·72				
‡*Lyra	Thornycroft	1910	240	25·6	7·10	3	780	13,500	28·88	2·4-in. B.L., 2–12 prs.	2	72	85e
‡*Martin		1910							28·9				
‡*Minstrel		1911							28·9				
‡*Nemesis		1910							27				
‡*Nereide	Hawthorn	1910							27·8				
‡*Nymphe		1911							27·5				
¶*Redpole		1910							29·8				
¶*Rifleman	White	1910							29·3				
¶*Ruby		1910							30·23				
‡*Sheldrake	Denny	1911							28·3				
‡*Staunch		1910							28·6				
‡*Acheron	Thornycroft	1911	251¾	26·4	8·7½	2	780	15.500	29·4	2 4-in. Q.F., 2 12-prs.	2	72	89
‡*Ariel		1911							29·4				
‡*Archer	Yarrow	1911	240	25·7	8·5	2	780	16,000	30·9	2 4-in. Q.F., 2 12-prs.	2	72	87
‡*Attack		1911							30·6				
‡*Badger	Parsons	1911	240	25·10	8·4	2	780	16,500	*d*	2 4-in. Q.F., 2 12-prs.	2	72	86
‡*Beaver		1911							*d*				
‡*Defender	Denny	1911							28·3				
‡*Druid		1911							*d*				
¶*Ferret	White	1911							30·2				
¶*Forester		1911							29·8				
‡*Goshawk	Beardmore	1911							*d*				
‡*Hind		1911							28·1				
‡*Hornet	John Brown	1911	240	25¾	7·10	3	750	13,500	*d*	2 4-in. Q.F., 2 12-prs.	2	72	89
‡*Hydra		1912							*d*				
‡*Jackal	Hawthorn	1911							26·9				
‡*Tigress		1911							28·6				
‡*Lapwing	Cammell Laird	1911							*d*				
‡*Lizard		1911							*d*				
‡*Phœnix	Vickers	1911							*d*				
‡*Sandfly	Swan, Hunter	1911							27·7				
‡*Firedrake									33·2				
‡*Lurcher	Yarrow	1912	255	25·7	8·6	2	860	20,000	35·3	2 4-in. Q.F., 2 12-prs.	2	72	86
‡*Oak									32·4 *f*				

* Fitted with turbines and for using oil fuel. † Have Thornycroft W.T. boilers. ‡ Fitted with modified Yarrow W.T. boilers.
§ Fitted with turbines and for using coal. ¶ Fitted with White-Forster boilers.
b Purchased after completion, March, 1909, to replace Tiger and Gala.
c Purchased after completion, December, 1909, to replace Blackwater and Lee. *d* Designed speed, 27 knots; trial speed not published.
e Estimated. *f* Tested with additional 100 tons load.

Great Britain—*continued.*

Name or Number.	Built by.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal or Oil.
OCEAN-GOING DESTROYERS—*contd.*			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
‡*Acasta	John Brown	1912											
‡*Achates	John Brown	1912	260	27	9·4	3	935	24,500	29	3 4-in.	2	100	129
‡*Ambuscade	John Brown	Bldg.											
‡*Ardent	Denny	Bldg.	260	28	9·2	2	935	24,000	29·5	3 4-in.	2	100	142
‡*Christopher	Hawthorn	1912											
‡*Cockatrice	Hawthorn	1912	260	27	9·4	3	935	24,500	29	3 4-in.	2	100	129
‡*Contest	Hawthorn	Bldg.											
‡*Fortune	Fairfield	Bldg.	260	27	9·2½	2	952	25,000	30·5	3 4-in.	2	100	129
‡*Garland	Cammell Laird (*b*)	Bldg.	260	27	9·2½	2	952	24,500	31	3 4-in.	2	100	..
‡*Hardy (*a*)	Thornycroft	1912	257	26½	8·0	..	935	24,500	32	3 4-in.	2	100	..
‡*Lynx	London and Glasgow Co.	Bldg.											
‡*Midge	London and Glasgow Co.	Bldg.	260	27	9·4	3	935	24,500	29	3 4-in.	2	100	129
‡*Owl	London and Glasgow Co.	Bldg.											
‡*Paragon	Thornycroft	Bldg.											
‡*Porpoise	Thornycroft	Bldg.	257	26½	9·2½	2	928	22,500	31	3 4-in.	2	100	128
‡*Unity	Thornycroft	Bldg.											
‡*Victor	Thornycroft	Bldg.											
‡*Shark	Swan, Hunter	1912											
‡*Sparrowhawk	Swan, Hunter	1912	260	27	9·4	3	935	24,500	29	3 4-in.	2	100	129
‡*Spitfire	Swan, Hunter	1912											
‡*Florizel	Fairfield	Bldg.											
‡*Ivanhoe	Fairfield	Bldg.											
‡*Talisman	Fairfield	Bldg.											
‡*Waverley	Fairfield	Bldg.											
‡*Rob Roy	Palmer (*b*)	Bldg.											
‡*Rocket	Palmer (*b*)	Bldg.											
‡*Picton	Beardmore	Bldg.											
‡*Portia	Beardmore	Bldg.											
‡*Sarpedon	Swan, Hunter	Bldg.											
‡*Ulysses	Swan, Hunter	Bldg.	260	27·7	..	2	945	24,500	31-2	3 4-in.	..	100	..
‡*Redgauntlet	White	Bldg.											
‡*Rosalind	White	Bldg.											
‡*Orlando	Denny	Bldg.											
‡*Viola	Denny	Bldg.											
‡*Daring	Thornycroft	Bldg.											
‡*Dragon	Thornycroft	Bldg.											
‡*Haughty	Yarrow	Bldg.											
‡*Havock	Yarrow	Bldg.											
‡*Hereward	Yarrow	Bldg.											
‡*Hotspur	Yarrow	Bldg.											
TORPEDO BOATS. FIRST CLASS—													
025–027 (3 boats)	Thornycroft	1886	127·5	12·5	6·2	1	60	600	21	2-3 prs.	3	..	10
033	Yarrow	1886	125	13	5·5	1	66	670	19·5	2-3 prs.	5	15	20
034	White	1886	125	14·6	4	1	66	950	18–19	..	5	15	..
041, 042 (2 boats), 049–055 (7 boats), 057, 058 (2 boats)	Thornycroft	1886	127·5	12·5	6·2	1	60	700	21	2-3 prs.	4	15	..
065–068 (4 boats), 071–074 (4 boats), 076–078 (3 boats)	Yarrow	1886	125	13	5·5	1	75	700	19–20	2-3 prs.	5	15	20
079	,,	1886	125	13	5·5	..	75	1,000	22·4	2-3 prs.	..	15	20
80	,,	1887	135	14	6	1	105	1,540	23	4-3 prs.	5	21	30
81 (*ex*-Swift)	White	1885	150	17·5	..	1	125	..	..	6-3 prs.	3	25	35
82, 83 (2 boats)	Yarrow	1889	130	13·5	5·5	1	85	1,100	23	3-3 prs.	3	19	20
85–87 (3 boats)	,,	1889	130	13·5	5·5	1	85	1,100	23	3-3 prs.	3	19	20
88, 89 (2 boats)	,,	1894	142	14·75	4·5	1	112	1,600	..	3-3 prs.	3	18	20
90	,,	1895	140	14·25	3·7	1	100	1,430	..	3-3 prs.	3	18	18
91, 92 (2 boats)	Thornycroft	1894	140	15·5	7·5	1	130	2,400	23-24	3-3 prs.	3	18	25
93	,,	1893	140	15·5	5·4	2	130	2,200	23·5	3-3 prs.	3	18	25
95, 96 (2 boats)	White	1894	140	15·5	..	1	130	2,000	23·2	3-3 prs.	3	18	25
97	Laird	1893	140	15·5	..	1	130	2,690	23·35	3-3 prs.	3	18	25
98, 99 (2 boats)	Thornycroft	1901	160	17	8·4	1	178	2,850	25	3-3 prs.	3	32	20
101	M'Arthur	1888	130·5	14	..	1	92	1,060	21	2-3 prs.	3	18	35
102, 103 (2 boats)	Thornycroft	1888	134·6	14·8	7·1	1	96	1,050	23·2	2-3 prs.	3	18	..
104–105 (2 boats)	White	1889	130	14·5	..	1	95	1,250	20	2-3 prs.	3	18	..
107, 108 (2 boats)	Thornycroft	1901	160	17	8·4	1	178	2,850	25	3-3 prs.	3	32	20
109–113 (5 boats)	,,	1902	166	17·25	8·4	1	200	2,900	25	3-3 prs.	3	32	42
114–117 (4 boats)	White	1903	165	17·6	8·8	1	205	2,900	25	3-3 prs.	3	32	28
*Pro. 1905–6: 5 boats (1–5)	¶ White	1906	175	17½	5·8	3	235	3,750	26	2-12 prs.	3	35	20*f*
5 boats (6–10)†	¶ Thornycroft	1906–7	166½	17½	6·3	3	255	3,750	27·3	2-12 prs.	3	35	20*f*
2 boats (11–12)‡	¶ Yarrow	1907	172	18	5·3	3	225	3,750	26	2-12 prs.	3	35	20*f*
*Pro. 1906-7: 4 boats (13–16)	White	1907	182	18	5·10	3	256	4,000	26	2-12 prs.	3	..	23·5
2 boats (17–18)‡	Denny	1907	180	18	5·6	3	251	4,000	26	2-12 prs.	3	..	23·5
2 boats (19–20)†	Thornycroft	1907–8	178·6	18·3	6.5	3	280	4,000	26	2-12 prs.	3	..	23·5
2 boats (21–22)‡	Hawthorn	1907–8	185	18·6	6·6	3	308	4,000	26	2-12 prs.	3	..	23·5
No. 23 ‡	Yarrow	1907	177·3	18	5·4	3	253	4,000	26	2-12 prs.	3	..	23·5
No. 24 ‡	Palmer	1908	177	17 9	6·5	3	292	4,000	26	2-12 prs.	3	..	23·5
*Pro. 1907–8: 4 boats (25–28)	White	1908	182	18	6 6	3	283	4,000	26	2-12 prs.	3	..	25
2 boats (29–30)‡	Denny	1908	180	18	5·3	3	259	4,000	26	2-12 prs.	3	..	25½
2 boats (31–32)†	Thornycroft	1908	178·6	18·75	6·2	3	287	4,000	26·5	2-12 prs.	3	33	24½
2 boats (33–34)‡	Hawthorn	1909	185	18 6	6·5	3	306	4,000	26	2-16 prs.	3	..	23½
3 boats (35–36)‡	Palmer	1909	177	17·9	6 6	3	298	4,000	26	2-12 prs.	3	33	24

* Fitted with turbines and for using oil fuel. † Have Thornycroft W.T. boilers. ‡ Fitted with modified Yarrow W.T. boilers.
¶ These boats were originally named, as shown in the *Naval Annual* for 1906–1907.
a Fitted with Diesel engines for cruising purposes. *b* Turbines by Parsons. *f* 1000 knots.

Great Britain—*continued.*

Number.	Built by.	Launched.	Dimensions. Length.	Dimensions. Beam.	Number of Screws.	Submerged Displacement.	Indicated Horse-Power.	Speed. Surface.	Speed. Submerged.	Torpedo Tubes.	Complement.	Fuel.
SUBMARINES.			Feet.	Feet.		Tons.		Knots.	Knots.			Tons.
9 boats (Nos. A 5–A 13, 1903–4) ..	Vickers	1904	150	..	..	204	600	16	9	2	..	..
10 boats (B Class) ..	"	1905	135	13½	..	313	600	13	9	2	..	15
10 boats (1905-6) C class	"	1906-7	135	13½	..	313	600	14	10	2	..	15
5 boats (1906-7) C12–16	"	1907–8	135	13½	..	313	600	13	..	2	..	15
1 boat (1906-7) D 1 ..	"	1908	..	..	2	595	1,200	16	10	3	..	..
2 boats (1906-7) C 17 & C 18	Chatham	1908	135	13½	..	313	600	13	..	2	..	15
2 boats (1907–8) C 19–C 20..	Chatham	1909	135	13½	..	321	600	13	10	2	..	15
10 (1907–8)— C 21–C 24 .. .. C 25–C 30	Vickers	1908 1909	135	13½	..	321	600	13	..	2	..	15
2 (1908-9) C 33–C 34 .	Chatham	1910	135	13½	..	321	600	13	..	2	..	15
7 (1908–9)— C 31–C 32	Vickers	1909	135	13½	..	321	600	13	..	2	..	15
C 35-C 36	"	1909										
C 37–C 38	"	1910										
D 2	"	1910	..	..	..	..	..	..	..	3	..	..
2 (1909-10) D 7–D 8..	Chatham	1911	..	..	..	604	1200	..	..	3	..	..
4 (1909-10) D 3–D 6..	Vickers	1911	..	..	..	..	..	..	..	3	..	..
2 (1910-11) E 1–E 2..	Chatham	1912	176	22½	..	800	1600	15	..	..	..	..
4 (1910-11) E 3-E 6..	Vickers	1912	176	22½	..	800	1600	15	..	..	..	..
2 (1911–12) E 7–E 8..	Chatham	1912	..	..	..	..	..	..	..	..	..	..
3 (1911–12) E 9–E 11.	Vickers	Bldg.	..	..	..	..	..	..	..	..	..	..
1 (1911–12), Special Laurenti type ..	Scotts'	Bldg.	..	..	..	..	..	..	..	..	..	..
2 (1912-13) E 12–E 13	Chatham	Bldg.	..	..	..	..	..	..	..	..	..	..
3 (1912–13) E 14–E 16	Vickers											
2 (1912–13) Special ..	Vickers											
2 (1912–13) Special ..	Armstrong ..											

FLOTILLAS OF THE DOMINIONS.

Australia.

Name or Number.	Built by.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Mean Speed on Trial, or expected.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
TORPEDO-BOAT DESTROYERS.	-		Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Yarra	Denny	1910	245¾	24¼	7·8	3	700	9,500	27	1 4-in., 3 12-pdr.	3	66	130
Parramatta	Fairfield	1910	245¾	24¼	7·8	3	700	9,500	28·48				
Warrego	Fairfield*	1911	245¾	24¼	7·8	3	700	9,500	28				
Swan	Commonwealth .	Bldg.	Details not published.			..	..	..	..	..	..	..	..
Derwent	Dockyard .. .												
Torrens	Sydney												
SUBMARINES.													
2 boats	Vickers	Bldg	Details not published.			..	..	..	..	..	..	..	..

* Transported in sections and reconstructed in Australia.

Argentine Republic.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Corrientes	Yarrow ..	1896	190	19·6	7·4	2	280	4,000	27·4 t.	1 14-pr.	3	54	80
Missiones..	Yarrow ..	1896	190	19·6	7·4	2	280	4,000	26·0 t.	3 6-pr,	3	54	80
Entre Rios	Yarrow ..	1896	190	19·6	7·4	2	280	4,000	26·7 t.	Q.F., 2 M.	3	54	80
Mendoza, Rioja, Salta, San Juan ..	Nantes ..	1911	283·2	28·3	9·9	..	950	18,000	32	4 4-in.	4	110	250*
Catamarca, Jujuy ..	Germania ..	1911	286·7	27·1	9·6	2	940	18,000	32	4 4-in.	4	110	250*
Cordoba, La Plata ..	Schichau ..	1911	279	29·6	7·3	..	890	19,000	34·7	4 4-in.	4	110	290*
FIRST CLASS—													
2 boats	Thornycroft	1890–1	150	14·5	5·2	2	110	1,500	24·52	3 3-prs.	3	27	22
6 boats	Yarrow ..	1890	130	13·5	6	1	85	1,200	23–24	2 3-pr. Q.F.	2	15	15

The two 150-ft. boats are named Comodoro Py and Murature.

The six 130-ft. boats are named Bathurst, Buchardo, Jorge, King, Pinedo, and Thorne.

* Also oil fuel 50–110 tons. French boats, Rateau turbines; German, German Admiralty type. Four large destroyers are to be built to replace four built by Messrs. Cammell Laird, which have been sold to Greece.

Austria-Hungary.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Tatra, Balaton, Csepel, Lika, Orjenn, Triglav ..	Fiume.. ..	1912 and Bldg.	265·9	25·6	8·0	..	800	17,000	32·5	2 4-in; 4 12-pr.	2	..	..
Huszar	Yarrow ..	1905											
Streiter		1906											
Ulan		1906											
Wildfang	Trieste ..	1906											
Uskoke		1907											
Scharfschütze		1907	219·8	20·3	..	2	383	6,000	28·5	1 12-pr. 7 3-pr.	..	64	..
Dinara													
Csikos													
Pandur	Fiume ..	1908											
Reka		1909											
Turul													
Velebit													
FIRST CLASS—													
Kaiman	Yarrow ..	1905											
Alligator													
Anaconda													
Drache													
Delphin													
Greif..													
Hai													
Krokodil	Trieste ..	1906–7											
Moewe													
Narwal													
Pinguin													
Schwalbe			179·9	18·0	8·6	1	197	3,000	26	4 3-pr.	..	25	..
Seehund													
Wal													
Triton													
Alk													
Echse													
Hydra													
Kormoran	Fiume ..	1910											
Krake													
Molk..													
Phönix													
Polyp													
Skorpion													
Boa													
Cobra	Yarrow ..	1898–9	152·6	15·3	7·6	1	133	2,000	24·3	2 3-pr.	3	24	30
Kigyo													
Python													
Viper	Yarrow ..	1896	147·6	14·9	7·6	1	130	2,000	26·5	2 3-pr.	2	26	30
Natter	Yarrow ..	1896	150	17·5	8·8	2	152	2,300	26·5	2 3-pr.	3	..	30
I—XII	Trieste (8) and Fiume (4)	1909 1910	188	19·0	5·0	..	250	5,000	28·5	2 3-pr.	3	..	..
XIII—XXIV		Pro.											
SUBMERSIBLES—													
U 1 and 2	Pola	1908–9	100	9·8	..	..	216 240	720 200	12·2–7·3	..	3	..	..
U 3 and 4	Kiel, Germania	1908	141·8	12·6	..	2	235 295	600 320	12–9	..	2	17	..
U 5 and 6	Fiume.. ..	1909	105	21·0	..	..	235	500	11·4–10	..	2	..	..
U 7—10	Fiume.. ..	Bldg.	..	..	..	..	500	..	..	..	..	..	..

The destroyers have Yarrow boilers. About twenty torpedo-boats (83 tons), built 1890–92, are of doubtful value.
Submarines U 11–15 ordered, Germania, Kiel, 520 tons submerged, Diesel engines.

Brazil.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Para		1908						7,014	27·25				
Amazonas		1908						6,898	27·17				
Piahuy		1908						6,563	27·21				
Matto Grosso		1908						7,403	27·16				
Parahyba..		1909						6,700	27·29				
Rio Grande do N. ..	Yarrow ..	1909	240	23·6	10	2	550	7,778	27·27	2 4-in., 4 3 prs.	2	..	140
Alagoas		1909						7,403	27·25				
Santa Catharina ..		1909						6,982	27·30				
Parana		1910						8,877	28·74				
Sergipe		1909						8,554	27·60				
FIRST CLASS—													
Pedro Ivo.. .. .. Silvado	Elbing ..	1892–3	152	17·1	7·9	2	130	2,200	28	2–1 prs.	3	24	30
Goyaz	Yarrow ..	1907	152·5	15·3	..	3	..	..	26·5	2–3 prs.	2	..	..
Gonzales	Thornycroft	1908	152·5	15 3	..	3	..	..	26·5	2–3 prs.	2	..	..

Five additional destroyers and three large submarines are proposed. Three submersibles are building at Muggiano (F.I.A.T.), Medusa type improved. A Special Laurenti submarine salvage and testing vessel is to be built, 3800 tons, 328 ft. long, 50 ft. beam.

Chile.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Almirante Lynch, Condell, Simpson, Goñi, Williams Robolledo, and Riveros (6)	White.. ..	1912 and Bldg.	320	32·6	11·1	3	1500	27,000	31	6–4-in. 2 M.	3	..	507
Capitan Orella ..	Laird	1896	210	21·6	5·4	2	300	6,000	30·17	1-12 pr. Q.F. 5-6 pr.	2	65	90
Capitan Munoz Gamero.. ..	Laird	1896	210	21·6	5·4	2	300	6,000	30·42	1-12 pr. Q.F. 5-6 pr.	2	65	90
Teniente Serrano ..	Laird	1896	210	21·6	5.4	2	300	6,000	30·35	1–12 pr. Q.F. 5-6 pr.	2	65	90
Guardia-Marina Riquelme	Laird	1896	210	21·6	5·4	2	300	6,000	30·09	1-12 pr. Q.F. 5-6 pr.	2	65	90
Capitan Merino Jarpa .. .. .. Capitan O'Brien ..	Laird	1901	210	21·6	5·4	2	350	6,000	30	Do.	2	65	90
FIRST CLASS—													
Injeniero Hyatt, Cirujano Videla, Injeniero Mutilla, Guardia-Marina Contreras, Capitan Thompson, and Teniente Rodrigues (Viper type) ..	Yarrow ..	1896 1898	152·6	15·3	7·9	1	140	2,200	27·5 27·2	3-3 pr. Q.F.	3	28	40

The Thompson and Rodriguez were sent out in sections, and put together at Talcahuano and Valparaiso. Submarines Antofagasta and Iquique building, Electric Boat Co., N.Y.

China.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
3 boats	Elbing ..	1912	..	..	..	..	400	6000	32	2 12-pr., 4 3-pr.	2	..	..
Luang Tuan	Trieste ..	1912	..	..	..	..	400	6000	32	2 12-pr., 2 3 pr.	2	..	..
2 boats	Stettin ..	1897	123·5	21·7	..	..	120	..	20	2 1-pr.	3	20	15
Hupeng, Huchung, Hujing, Hungo ..	Kobe	1906–7	..	..	..	..	97	950	23	2 3-pr.	3	..	..
SECOND CLASS—													
1 boat	Foochow ..	1903	88·6	6·7	3·3	1	30	550	20·5				

Denmark.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
First Class—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Ormen	Copenhagen	1907	125	14·3	..	..	98	2,000	26	2 1-pr.	3	..	21
Hajen	Copenhagen	1896											
Havörnen	Copenhagen	1897	154·3	15·4	7·9	2	142	2,317	22·9	1 4·7-in. 1 1-pr.	3	..	..
Söbjörnen	Copenhagen	1898											
Delfinen	Thornycroft	1883	111·5	12·6	6	1	59	620	20	1 mach.	2	14	9
Havhesten	Thornycroft	1888	137·9	14	7	1	94	1,200	22·8	2 1-pr. revs.	4	20	15
Hvalrossen	Thornycroft	1884	114	12·6	6·5	1	64	660	18·7	1 mach.	2	14	10
Makrelen	Copenhagen	1893	140	14·2	7	2	112	1,200	..	..	..	..	16
Narhvalen	Thornycroft	1888	137·9	14	7	1	94	1,200	22·3	2 1-pr. revs.	4	20	15
Nord Kaperen.. ..	Copenhagen	1893	140	14·2	7	2	112	1,200	..	2 1-pr. revs	4	..	16
Sölöven	Thornycroft	1887	131	14·8	6·8	1	89	1,200	23·3	2 mach.	4	20	14
Sóulven	Havre.. ..	1880	94·8	10·9	3·9	1	37	450	18·1	..	2	12	5
Springeren	Copenhagen	1891	119	13	4·9	1	81	800	18·3	2 1-pr. revs	2	20	14
Stören	Thornycroft	1887	131	14·8	6·8	1	89	1,200	23	2 mach.	4	20	14
Sværdfisken	Thornycroft	1881	110	12	6	1	49	600	20·7	1 mach.	2	14	9

Destroyers (230 tons, 27 knots), built, as follows:—Fyvesfisken (Schichau); Soridderen (Yarrow), 27 2 knots; Soulven, Spaekhuggeren (Copenhagen dockyard); Tumleren, Vindhunden (Burmeister and Wain). Three others in hand. Electric submersible Dikkeren, delivered by F.I.A.T. Co., Muggiano, 1909.—Length, 114 ft. 3 in.; beam, 11 ft.; 103–130 tons, 12·7½ knots. Submersibles Havmanden and Havfruen, of the Holland type, are being built by the Whitehead company, one at Fiume, the other at Copenhagen dockyard.

France.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
Destroyers—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Arbalète	Normand ..	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Arc	Châlon ..	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Arquebuse..	Normand ..	1902	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Baliste	Rouen ..	1903	183·9	20·11	10·3	2	300	6,000	29·4	1-9pr. 6-3prs.	2	62	75
Bélier	Nantes ..	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Bombarde	Havre (F.&C.)	1903	183·9	20·11	10·3	2	300	6,000	30·5	1-9pr. 6-3prs.	2	62	75
Bouclier	Normand ..	1910	233·8	24·9	9·7	3	715	15,000	33·4	2-3·9in.4-9pr.	4	62	160
Boutefeu	Bordeaux ..	1909	233·8	24·9	9·7	3	715	13,000	31	2-3·9in 4-9pr.	4	62	160
Branlebas	Normand ..	1907	193·9	21·3	10·3	2	320	5,000	28	1-9prs.6-3prs.	2	62	84
Carabine	Rochefort ..	1902	183·9	20·11	10·3	2	305	6,300	28	1-9pr. 6-3prs.	2	62	75
Carabinier	Rouen	1908	210·6	21·9	10·3	3	430	7,200	28	6–9 prs.	3	62	120
Carquois	Rochefort ..	1907	190·3	19·6	10·3	2	335	7,200	30	19-pr.4 3-prs.	2	62	37
Casque	Havre(F.&C.)	1909	233·8	24·9	9·7	3	715	13,000	35·6	2-3 9in.4-9pr.	4	62	160
Catapulte	Havre (F.&C.)	1903	183·9	20·11	10·3	2	300	6,000	28	1 9pr. 6-3prs.	2	62	75
Cavalier	Normand ..	1910	210·6	21·8	10·3	3	469	8,600	31·2	6–9 prs.	3	62	150
Chasseur	Normand ..	1909	210·6	21·9	10.3	3	454	7,200	28	6–9 prs.	3	62	120
Cimeterre	Bordeaux ..	1909	246·0	26	9·7	3	730	13,500	32·7	2-3 9in.4-9pr.	4	62	160
Claymore	Normand ..	1906	190·3	20·11	10·3	2	335	6,000	30·3	1-9pr. 6-3prs.	2	62	75
Cognée	Toulon ..	1907	190·3	20·11	10·3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Coutelas	Rochefort ..	1907	190·3	20·11	10·3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Dague..	Bordeaux ..	1910	246·0	26	9·7	3	730	13,000	33·2	2-3 9in.4-9pr.	4	62	160
Dard	Rouen ..	1903	183·9	20·11	10·3	2	310	6,500	29·4	1-9pr. 6 3prs.	2	62	75
Durandal	Normand ..	1899	180·5	20·8	10·3	2	300	5,000	28	1-9pr. 6 3prs.	2	62	84
Epée	Havre (F.&C.)	1900	190·3	20·8	10·3	2	335	5,700	26	-9pr. 6-3prs.	2	62	75
Epieu	Normand ..	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Escopette	Rochefort ..	1900	183·9	20·8	10·3	2	300	5,700	26	1-9pr. 6-3prs.	2	62	75
Etendard	Bordeaux ..	1908	210·6	21·9	10·3	3	430	6,000	28	1-9pr. 6-3prs.	3	..	..
Fanion..	Bordeaux ..	1908	210·6	21·9	10·3	3	430	6,000	28	1-9pr. 6 3prs.	3	..	..
Fanfare	Normand ..	1907	193·9	21·3	10·3	2	320	5,000	28	1-9pr. 6-3prs.	2	62	84
Fantassin	Havre (F.&C.)	1909	210·6	21·8	10·3	3	469	8,600	30·5	6–9 prs.	3	62	150
Fauconneau	Normand ..	1904	210·6	21·9	10·3	3	430	6,000	28	1-9pr. 6-3prs.	3	..	..
Faulx	Nantes ..	1911	233·8	24·9	9·7	3	715	13,000	32	2-3·9in.4-9pr.	4	62	160
Flamberge..	Rochefort ..	1901	183·9	20 8	10·3	2	300	5,700	26	1-9pr. 6-3prs.	2	62	75
Fleuret	Rochefort ..	1907	190·3	20·11	10·3	2	335	6,000	28	1-9pr. 6-3prs	2	62	75
Fourche	Nantes ..	1909	233·8	24·9	9.7	3	715	13,000	33 8	2-3·9in 4-9pr.	4	62	160
Francisque..	Rochefort ..	1904	183·9	20·11	10·3	2	305	6,300	28	1-9pr. 6-3prs.	2	62	75
Fronde	Bordeaux ..	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	65
Gabion	Rouen ..	1907	210·6	21·9	10 3	3	430	6,000	28	1-9pr. 6-3prs.	3	..	..
Glaive..	Rochefort ..	1908	190·3	20·11	10·3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Hache	Toulon ..	1908	190·3	20·11	10·3	2	335	6,000	28	1-9pr. 6-2prs.	2	62	75
Hallebarde	Normand ..	1899	180·5	20·8	10·3	2	305	5,300	27·2	1-9pr. 6-3prs.	2	62	84

N.B.—"F. & C." "Forges et Chantiers." "Normand" means that the boat has been built at that firm's yard at Havre.

France—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement	Coal Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
DESTROYERS—*cont.*													
Harpon	Bordeaux ..	1903	183·9	20·11	10·3	2	300	6,000	28	1 9pr. 6-3prs.	2	62	75
Hussard	Lorient ..	1909	210·6	21·9	10·3	3	430	7,200	28	6-9 prs.	3	62	120
Janissaire	Rouen.. ..	1910	210·6	21·8	10·3	3	469	8,600	28·5	6-9 prs.	3	62	150
Javeline	Nantes ..	1903	183·9	20·11	10 3	2	300	7,000	29·3	1-9pr. 6 3prs.	2	62	75
Lasnquenet	Bordeaux ..	1909	210·6	21·8	10 3	3	469	8,600	28	6-9 prs.	3	62	150
Mameluck	Nantes ..	1909	210·6	21·8	10·3	3	469	8,600	28	6-9 prs.	3	62	150
Massue	Toulon ..	1908	190·3	20·11	10·3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Mortier	Rochefort ..	1906	190·3	20·11	10·3	2	335	6,300	28	1-9pr. 6-3prs.	2	62	75
Mousquet	Nantes ..	1902	183·9	20·11	10·3	2	300	6,300	30 2	1-9pr. 6-3prs.	2	62	75
Mousqueton	Châlon ..	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Obusier	Rochefort ..	1907	190·3	20·11	10·3	2	335	6,300	28	1-9pr. 6-3prs.	2	62	75
Oriflamme..	Nantes ..	1908	210·6	21·9	10 3	3	430	6,000	28	1-9pr. 6-3prs.	3	..	..
Pertuisane	Rochefort ..	1900	183·9	20·8	10.3	2	300	5,700	26	1-9pr. 6-3prs.	2	62	75
Pierrier	Rochefort ..	1906	190·3	20·11	10.3	2	335	6,300	28	1-9pr. 63-prs.	2	62	75
Pique	Havre (F.&C.)	1900	190·3	20·8	10.3	2	335	5,700	26	1-9pr. 6-3prs.	2	62	75
Pistolet	Nantes ..	1903	183·9	20·11	10.3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Poignard	Rochefort ..	1909	190·3	20·11	10.3	2	335	6,000	28	1-9pr. 6 3prs.	2	62	75
Rapière	Rochefort ..	1901	183·9	20·8	10·3	2	300	5,700	26	1-9pr. 6-3prs.	2	62	75
Sabre	Rochefort ..	1904	183·9	20·11	10·3	2	305	6,300	28	1-9pr. 6-3prs.	2	62	75
Sabretache..	Nantes ..	1908	210·6	21·9	10·3	3	430	6,000	28	6-9 prs.	3	..	..
Sagaïe..	Havre(F.&C.)	1902	183·9	20·11	10·3	2	300	6,000	30·1	1-9pr. 6-3prs.	2	62	75
Sape	Rouen ..	1907	210·6	21·9	10·3	3	430	6,000	28	1-9pr. 6-3prs.	3	..	..
Sarbacane	Rochefort ..	1903	183·9	20·11	10·3	2	305	6,300	28	1-9pr 6-3prs.	2	62	75
Spahi	Havre.. ..	1908	210·6	21·9	10 3	3	430	7,200	28	6-9 prs.	3	62	120
Stylet	Rochefort ..	1905	190·3	20·11	10·3	2	335	6,300	..	1-9pr. 6-3prs.	2	62	75
Takou *	Elbing ..	1898	193·7	21·0	..	2	280	6,000	25	6-3 pr. Q.F.	2	62	67
Tirailleur	Bordeaux ..	1908	206·9	21·8	9·7	3	410	7,200	28	6-9 pr.	2	62	120
Tromblon	Rochefort ..	1905	190·3	21 0	10·3	2	335	6,300	25	6-3 pr. Q.F.	3	62	67
Trident	Rochefort ..	1907	190·3	19·6	10·3	2	335	7,200	30	1-9pr. 6-3prs.	2	62	87
Voltigeur	Nantes ..	1909	210·6	21·9	10·3	3	430	7,200	28	6-9 prs.	3	62	120
Yatagan	Nantes ..	1900	190 3	20·8	10·3	2	335	5,700	26	1-9pr. 6-3prs.	2	62	33
Bory, Garnier, Rivière, Mehl, Dehorter (5).. ..	Normand, &c. ..	1911	243	24·9	10·0	2	740	14,500	31	2 3·9-in., 4 9 prs.	4	81	120
Bisson, Renaudin, Protet, Magon, Comm. Lucas, Mangini (6)	Toulon, etc.	1912 & Bldg.	243	24·9	10 0	3	750	18,000	31	2 3 9-in., 4 9 prs.	4	81	120
Henry, Herbert (2).. ..	Rochefort ..	1911	214·6	21·6	7 8	3	450	8,600	28·5	6 9 prs.	2	62	..
Roux, Lestin (2)	Rochefort ..	Bldg.	..	..	..	..	850	..	..	2 3·9 in., 4 9 prs.	..	..	81
SEA-GOING—													
Aquilon	Normand ..	1895	137·8	14·6	7·9	2	127	2,000	26·17	2-3 prs.	2	34	17
Audacieux..	Nantes ..	1900	144·2	15·2	10·0	2	152	4,200	30	2-3 prs.	3	..	18
Borée	Bordeaux ..	1900	147·7	16·7	8·0	2	160	4,400	30	2-3 prs.	2	..	18
Bourrasque	Normand ..	1901	147·7	16·7	8·0	2	160	4,400	31·41	2-3 prs.	2	..	18
Chevalier	Normand ..	1893	144·3	15·7	6·8	2	134	2,700	27·2	2-1 prs.	2	32	17
Cyclone	Normand ..	1898	144·2	15·2	10·0	2	152	4,200	30	2-3 prs.	2	..	18
Flibustier	Normand ..	1894	143	16·4	9·3	2	132	1,500	23·5	2-3 prs.	2	34	16
Forban	Normand ..	1895	144·2	15·2	10	2	135	3,200	31·2	2-1 prs.	2	..	..
Grenadier	Normand ..	1892	138	14·7	8·2	2	129	1,400	25·25	2-3 prs.	2	26	15·5
Grondeur	Havre (F.&C.)	1892	147·5	14·5	5	2	130	1,550	24	2-3 prs.	2	27	20
Mistral	Normand ..	1901	147·7	16·8	8·8	2	182	4,200	30	2-3 prs.	3	..	23
Rafale..	Normand ..	1901	147·7	16·7	8·0	2	160	4,400	31·47	2-3 prs.	2	..	18
Simoum	Havre (F.&C.)	1901	144·2	15·2	10·0	2	152	4,200	30	2-3 prs.	3	..	18
Siroco	Normand ..	1901	147·7	16·8	8·8	2	182	4,200	30	2-3 prs.	3	..	23
Tramontane	Bordeaux ..	19 0	147·7	16·7	8·0	2	160	4,400	30	2-3 prs.	2	..	18
Trombe	Nantes ..	1900	144 2	15·2	10·0	2	152	4,200	30	2-3 prs.	3	..	18
Typhon	Havre (F.&C.)	1901	144·2	15·2	10 0	2	152	4,200	30	2-3 prs.	3	..	18
FIRST CLASS—													
212–215 (4 boats).. ..	Normand ..	1899	121·4	13·6	8·6	1	86	1,800	27	2-1 prs.	2	23	10
216–226 (11 boats).. ..	Cherbourg, Toulon, etc.	1899-1902	121·6	13·6	8·6	1	86	1,500	23·5	2-1 prs.	2	23	10
227–235 (8 boats).. ..	Bordeaux, etc.	1901	121·4	13·2	8·7	1	86	1,500	23·5	2-1 prs.	2	23	10
236–255 (20 boats) ..	Bordeaux, etc.	1902	121·4	13·2	8·7	1	90	1,500	23·5	2-1 prs.	2	23	10
256–257 (2 boats).. ..	Bordeaux, etc.	1900	124·8	13·2	8·7	1	97	2,000	26·0	2-1 prs.	3	24	10
258–261 (4 boats).. ..	Bordeaux ..	1902	124·8	13·2	8·7	1	97	2,000	26·0	2-1 prs.	3	24	10
262 (1 boat)..	Creusot ..	1902	124·8	13·2	8·7	1	97	2,000	26·0	2-1 prs.	3	24	10
264–265 (2 boats).. ..	Bordeaux ..	1902	124·8	13·2	8·7	1	97	2,000	26·0	2-1 prs.	3	24	10
266–276 (11 boats) ..	Bordeaux, etc.	1902	124 8	13·2	9·6	1	97	2,000	26·0	2-1 prs.	3	24	10
277–294 (18 boats) ..	Bordeaux, etc.	1904	124·8	14·0	9·6	1	97	2,000	26·0	2-1 prs.	3	26	10
295–317 (23 boats) .. ; 318–367 (50 boats) .. ; 368–369 (2 boats).. ..	Normand, etc. ; Havre, etc. ; Toulon ..	1905 ; 1905–7 ; 1906	124·8	14·0	9·6	1	97	2,000	26	2-1 prs.	3	26	10

* Captured from the Chinese at Taku, 1900.

France—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.
			Feet.	Feet.	Feet.		Tons.		Knots			
SUBMARINES—												
Aigrette	Toulon ..	1904	117·6	12·9	8·3	1	172	200	10·5	..	..	20
Algérien	Cherbourg ..	1901	118	9·2	..	1	146	250	8–13	..	..	9
Alose	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5
Anguille	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5
Bonite..	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5
Calypso	Toulon ..	1907	154·3				344				7	..
Castor	Rochefort ..	1903	77	7·6	8·0	1	68	60	8	..	..	5
Cigogne	Toulon ..	1904	117·6	12·9	8·3	1	172	200	10·5	..	..	20
Circé	Toulon ..	1907	154·3				344				7	..
Dorade	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5
Emeraude	Cherbourg ..	1906	146	12·9	12·0	2	390	600	12	..	6	16
Espadon	Cherbourg ..	1901	111·6	12·4	5·4	1	106–200	250	8–12	..	2	10
Esturgeon	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5
Follet	Rochefort ..	1901	135·8	9 5	9·5	1	185	..	8–12¼	..	..	9
Français	Cherbourg ..	1901	118	9·9	..	1	146	250	8–13	..	..	9
Gnome	Rochefort ..	1901	135·8	9·5	9·5	1	185	..	8–12¼	..	..	9
Grondin	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5
Korrigan	Rochefort ..	1901	135·8	9·5	9·5	1	185	..	8–12¼	..	..	9
Loutre	Rochefort ..	1903	77	7·6	8·0	1	68	60	8	..	..	5
Ludion	Cherbourg ..	1902	77	7·6	8·0	1	68	60	8	..	..	5
Lynx	Cherbourg ..	1902	77	7·6	8·0	1	68	60	8	..	..	5
Méduse	Rochefort ..	1903	77	7·6	8·0	1	68	60	8	..	..	5
Naïade	Cherbourg ..	1902	77	7·6	8·0	1	68	60	8	..	..	5
Opale	Cherbourg ..	1906	146	12·9	12·0	2	390	600	12	..	6	..
Otarie	Rochefort ..	1903	77	7·6	8·0	1	68	60	8	..	..	5
Oursin	Rochefort ..	1903	77	7·6	8·0	1	68	60	8	..	..	5
Perle	Cherbourg ..	1903	77	7·6	8·0	1	68	60	8	..	..	5
Phoque..	Rochefort ..	1904	77	7·6	8·0	1	68	60	8	..	..	5
Protée	Cherbourg ..	1902	77	7·6	8·0	1	68	60	8	..	..	5
Rubis	Cherbourg ..	1907	154·3	12·9	12·0	2	390	600	12	..	6	16
Saphir	Toulon ..	1908	146	12·9	12·0	2	390	600	12	..	6	..
Silure	Cherbourg ..	1901	111·6	12·4	5·4	1	106–200	250	8–12	..	2	10
Sirène	Cherbourg ..	1901	111·6	12·4	5·4	1	106–200	250	8–12	..	2	10
Souffleur	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5
Thon	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5
Topaze	Cherbourg ..	1908	146	12·9	12·0	2	390	600	12	..	6	..
Triton	Cherbourg..	1901	111·6	12·4	5·4	1	106–200	250	8–12	..	2	10
Truite	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5
Turquoise	Toulon ..	1908	146	12·9	12·0	2	390	600	12	..	6	..
Dauphin	Cherbourg ..	1904	122·8	10·2	7·6	2	168	220	10¼	..	..	..
Argonaute	Toulon ..	1905	160·6	13·9	9.0	1	301	330	11	..	4	20
Pluviôse, Ventôse, Nivôse, Germinal, Floréal, Prairial, Messidor, Thermidor, Fructidor, Brumaire, Frimaire	Cherbourg ..	1907 to 1912	160	16·4	13·6	2	398	700	7¾–12½	..	7	24
Papin, Fresnel, Berthelot	Rochefort ..	1908 1909	160	16·4	13·6	2	398	700	7¾–12½	..	7	24
Monge, Ampère, Gay-Lussac	Toulon ..	1908 & 1909	160	16·4	13·6	2	398	700	7¾–12½	..	7	24
Foucault, Euler, Franklin, Watt, Cugnot, Giffard, Faraday, Volta, Newton, Montgolfier Pernouilli, Joule, Coulomb, Arago, Curie, Le Verrier, (16, Prog. 1905–6)	Cherbourg .. Rochefort .. Toulon ..	1909 1912	160	16·4	13·6	2	398	700	7¾–12½	..	7	24
Amiral Bourgeois	Cherbourg	1912	184·6	26·3	..	2	555–735	1,560	10–15	..	7	25
Archimède		1909	211·9	30·2	..	2	577–810	1,700	10–15	..	7	27
Mariotte		1911	212·6	..	..	2	53[illegible]–625	1,440	10–15	..	6	25
Charles Brun		1910	144 6	13·6	..	2	355–450	1,300	10–15	..	7	20
Clorinde	Rochefort ..	1912	174	16 9	10·9	2	391	1,300	15·8	..	7	20
Cornélie												
Gustave Zédé	Cherbourg ..	Bldg.	239 6	19·8	14·4	2	800–1000	2,400	10–20	..	8	40
Néréide												

Submersibles Q 94 and 95 (Rochefort), Q 96–99 (Toulon), Q 100 and 101 (Cherbourg), Q 102 (Rochefort), provided for—Estimates, 1912. Three (800 tons, Gustave Zédé class, 8 tubes, 3 officers, 37 men) to be begun 1913.

Germany.

Name or Number.	Where built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
D 3, D 4 (2 boats)	Elbing ..	1888	184	21·8	9·6	2	300	2,000	20	4 6-pr. 2 1-pr. revs.	3	48	90
D 5, D 6 (2 boats)	Elbing ..	1888–9	190·3	23	9·6	2	320	3,000	22¼	4 6-pr. 2 1-pr. revs.	3	48	90
D 7, D 8 (2 boats)	Elbing ..	1890	190·3	23	9·9	2	380	3,500	22¼	6 Q.F.	3	..	..
D 9	Elbing ..	1894	197·0	24·3	9·9	2	380	4,500	26	6 Q.F.	3	..	..
D 10	Chiswick ..	1898	211·9	19 6	8·1	2	310	5,800	28·5	5 3-pr.	3	52	80
Taku (ex Hai Ying)	Elbing ..	1898	183·7	21·0	..	2	280	6,000	30	6 3-prs.	2	..	67
S 90–101 (12 boats)	Elbing ..	1900	200	23	8·9	2	350	6,000	27 5	3 3-pr.	3	..	..
S 102–107 (6 boats)	Elbing ..	1900–1	200	23	8·9	2	350	6,000	27·5	3 3-pr.	3	..	..
G 108–113 (6 boats)	Kiel (Germania)	1901–2	200	22	8·9	2	350	6,000	29·2	3 3-pr.	3	49	100
S 114–119 (6 boats)	Elbing ..	1902–3	200	23	8·9	2	350	6,000	29·2	3 3-pr.	3	49	100
S 120–125 (6 boats)	Elbing ..	1904	200	23	8·9	2	350	6,000	29·2	3 3-pr.	3	49	100
S 126–131 (6 boats)	Elbing ..	1904–5	205	23	..	2	420	6,000	30	3 6-pr.	3	56	100
G 132–136 (5 boats)	Kiel (Germania)	1906	207·4	23	8·9	2	420	6,500	28	4 6-pr.	3	..	..
G 137	Kiel (Germania)	1907	226·4	25·4	9·8	3	570	10,000	32	1 14-pr. 3 3 pr.	3	72	170
S 138–149 (12 boats)	Elbing.. ..	1906–7	331	25·7	8·9	2	530	10,000	30	1 23-pr. 3 4-pr.	3	72	170
V 150–161 (12 boats)	Stettin (Vulcan)	1907–8	269	25·7	10·0	2	670	10,500	30	2 23-pr. 2 M.	3	83	175
V 162–164 (3 boats)	Stettin (Vulcan)	1908–9	..	..	..	..	616	15,000	30	2 23-pr. 2 M.	3	..	160
S 165–168 (4 boats)	..	..	..	..	..	..	..	..	..	..	..	..	..
G 169–173 (5 boats)	Kiel (Germania)	1908–9	..	..	..	..	616	15,000	30	2 23-pr. 2 M.	3	..	160
G 174–175 (2 boats) / S 176–179 (4 boats)* / V 180–185 (6 boats)	Kiel (Germania) / Elbing .. / Stettin (Vulcan)	1909 and 1910	233	25·9	7·6	..	640	16,000	32·5	2 23-pr. 2 M.	3	83	180
G 186–191 (6 boats)	Kiel (Germania)	1910	233	25·9	7·6	..	640	16,000	32·5	2 23-pr. 2 M.	3	83	180
V 192–197 (6 boats)	Stettin (Vulcan)	1911	233	25·9	7·6	..	640	16,000	32·5	2 23-pr. 2 M.	3	83	180
V 1–V 6 (6 boats)	Stettin (Vulcan)	1911	..	..	..	..	700	..	32½	2 23-pr. 2 M.	3	83	..
G 7–G 12 (6 boats)	Kiel (Germania)	1912	..	..	..	..	700	..	32½	2 23-pr. 2 M.	3	83	..
S 13–24 (12 boats)	Elbing ..	1912 and Bldg.	..	..	..	..	900	23,500	32½	2 23-pr. 2 M.	..	83	..
FIRST CLASS—													
T 42—T 47 (6 boats)	Elbing ..	1892	150	15·6	6·7	..	85–88	1,600	20–22½	2 1-pr. revs.	2	..	17
T 49—T 57 (9 boats)	Elbing ..	1893	154·3	16·4	..	2	110 / 145	1,600	..	..	3	..	..
S 58—S 87 (30 boats)	Elbing ..	1894–8	158·2	16·9	9·0	2	140	2,300	26	2 1-pr. revs.	3	..	32
G 88—G 89 (2 boats)	Kiel (Germania)	1898	154 3	16·5	..	..	160	2,500	26	2 mach.	3	22	..

NOTE.—The German destroyers (from S 90 downward) are given above in groups showing successive yearly programmes, the last series being that of 1912. The Estimates of 1913 provide for the building of two divisions of destroyers (12 boats).

A submarine boat (U 1), 180 tons, 128 ft. long, 8 ft. 10 in. beam, submerged displacement 240 tons, speed 12 and 9 knots, launched at the Germania Yard, August 30, 1905; U 2 to U 21 built at Germania Yard and Danzig; others building; U 21, 800 tons, 17–12 knots, two guns. The V destroyers have A.E.G. turbines; S boats, Schichau; and most of the G boats Parsons turbines (G 173, Zoelly).

* S 178 sunk in collision with the Yorck, March 4th.

Greece.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Naukratoussa .. / Thyella .. .. .. / Sphendoni .. .. / Lonchi	Yarrow ..	1906	220	20·6	7·2	2	350		32·1 / 31·79 / 31·84 / 32·53	2 12, 4 6-pr.	2	58	80
Nike.. . .. .. / Aspis .. .. .. / Doxa.. .. .. .. / Velos	Stettin (Vulkan)	1906	220	20·6	7·2	2	350	..	30	2 12, 4 6-pr.	2	58	80
Aetos, Leon, Pardalos, Jerex	Cowes ..	1911	285	29·9	9·6	..	980	19,750	32	4 4-in.	4	110	225
Keravnos .. .. .. / Neagenea	Stettin ..	1911	..	..	..	..	750	..	32·5	4 3·4-in.	2	..	..
SUBMARINES—													
Delphin, Xiphias ..	Chalon sur Saône ..	1911–12	164	..	..	..	300–460	..	14·9	..	5	..	..

Ten 125-ton torpedo-boats building in England and Germany.

Italy.

Name or Number.	Where Built	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
DESTROYERS—													
Fulmine	Sestri (Odero)	1898	200	20·4	5·4	2	298	4,800	28	1 12-pr. 3 6-pr. Q.F.	3	43	60
Lampo													
Freccia													
Dardo	Elbing (Schichau)	1899	196·8	21·3	5·8	2	320	6,000	30	1 12-pr. Q.F., 5 6-pr.	2	53	60
Strale		1901											
Euro													
Ostro													
Nembo													
Turbine													
Aquilone	Naples (Pattison)	1901	210	19·4	7·6	2	330	6,000	30	1 12-pr. Q.F., 5 6-pr.	2	53	66
Borea		1902											
Meteoro													
Tuono													
Zeffiro	Naples (Pattison)	1904	210	19·4	7·6	2	330	6,000	30	1 12 pr. Q.F., 5 6-pr.	2	53	60
Espero													
Bersagliere													
Artigliere		1906											
Granatiere		1907											
Lanciere													
Alpino	Genoa (Ansaldo, Armstrong)		211·6	20·0	7·6	3	365	6,000	30	4 12-pdr.	3	55	82
Corazziere													
Pontiere													
Carabinieri		1909											
Fucilieri		1910											
Garabaldino													
Impavido													
Impetuoso													
Indomito	Pattison (Naples)	1912 & Bldg.	246	24·6	7·6	..	650	15,000	30	1 4·7 in. 4 12-pr.	2	..	..
Insidioso													
Intrepido													
Irriquieto. . . .													
Ardito													
Ardente	Orlando (Leghorn)	1912 & Bldg.	246	24·6	7·6	..	650	15,000	30	1 4·7 in. 4 12 pr.	2	..	..
Audace													
Animoso													
Ascaro	Ansaldo ..	1912	..	..	..	..	380	..	29	..	..	..	..
FIRST CLASS—													
Aquila, Sparviero ..	Elbing ..	1888	152	17·2	7·9	2	130	2,200	26·6	2 3-pr. Q.F., 1 1-pr. Q.F., 1 1-pr. rev.	3	24	40
Nibbio, Avvoltoio ..													
Pellicano	Sestri (Odero)	1899	157·4	19	14·8	2	147	2,700	25	2 3-pr.	2	28	24
Condore	Sestri (Ansaldo)	1898	154·3	16·8	6·9	2	136	2,500	27	2 3-pr.	2	27	16
Sirio, Sagittario ..		1905–6											
Spica, Scorpione ..	Elbing ..	1905 6											
Serpente, Saffo ..		1905–6											
Alcione, Ardea ..													
Albatros, Aiorone ..	Odero	1905 1906	164	19·6	6·3	2	215	2,900 3,250	25	2 3-pr.	2	..	40
Astore, Arpia ..													
Orione, Orsa ..	Genoa (Ansaldo)	1905											
Olympia, Orfeo ..		1906											
Gabbiano	Spezia	1907											
Pegaso	Naples (Pattison)	1905											
Perseo		1905											
Procione		1905											
Pallade													
Cigno													
Cassiopea	Naples (Pattison)	1906	164	17·4	7·0	2	200	3,000	25·4 26·6	3 3-pr.	3		40
Calliope		1907											
Clio		1906											
Centauro		1907											
Canopo		1907											
Calipso	Naples (Pattison)	1909											
Climene		1909											
1 P.N.–12 P.N. ..	Pattison ..												
13 O.S.–24 O.S. ..	Odero	1912 & Bldg.	139	13·9	..	..	130	2,500	27	1 6-pr.	2	..	..
25 A.S.–32 A.S. ..	Ansaldo ..												
33 P.N.–38 P.N. ..	Pattison ..												
SECOND CLASS—													
No. 117	..	1895	131·2	16·4	..	1	85	1,000	..	2 1 pr. Q.F.	2	17	17
Nos. 136–8, 140–2 (6 boats)	Italy	1893–94	131·2	16·4	..	1	85	1,000	22	2 1-pr. Q.F.	2	17	17
Nos. 147, 149–152 (5 boats)	Italy ..	1894–5	131·2	16·4	..	1	85	1,000	22	2 1-pr. Q.F.	2	17	17

Fifteen destroyers, 1,000 tons, 32 knots, are to be built. The following names have been given: Francesco Nullo, Antonio, Mosto, Guiseppe Sirtori, Giacinto Carini (Pattison); Rosolino Pilo, Guiseppe Abba, Ippolito Nievo, Simone Schiaffino, Pilade Bronzetti, Giuseppe Missori (Odero), Alessandro Poerio, Cesare Rossarol, Guglielmo Pepe (Ansaldo).

Italy—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
SUBMARINE—													
Delfino	Spezia	1894	78·6	10·1	..	1	111	150	10–12	..	2	12	..
Glauco, Squalo, Narvalo, Otaria, Tricheco	Venice, &c.	1906 1907 1909	120	14·3	..	..	180 / 230	..	15	..	2	..	..
Foca, Medusa, Velella, Argo, Jalea .. Jantina, Salpa .. Fisalia, Zoea	Muggiano F.I.A.T. S. Giorgio	1908 to 1913	148	13·9	..	..	241 / 305	750	14·6 / 8·5	..	2	..	..
Nautilus, Nereide ..	Venice ..	Bldg.	..	..	..	..	..	..	..	..	..	..	..
G. Pullino, G. Ferraris	Spezia ..	1912	..	..	..	..	400	..	18–14	..	..	..	..
Atropo	Kiel, Germania)	1912	146	14·6	..	..	330	700 / 400	12¼ / 8¼	..	..	..	..

Japan.

Name or Number.	Where Built.	Launched.	Dimensions Length.	Dimensions Beam.	Dimensions Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
DESTROYERS—													
Murakumo	Thornycroft	1898	210·0	19·5	7·2	2	307	5,800	30 to 31	1 12-pr., 5 6-prs.	2	54	80
Shinonome	Thornycroft	1898											
Yugiri	Thornycroft	1898											
Shiranui	Thornycroft	1899											
Kagerou	Thornycroft	1899											
Usugumo	Thornycroft	1900											
Shirakumo	Thornycroft	1901	216·7	20·7	8·3	2	373	7,400	31	1 12-pr., 5 6-prs.	2	59	96
Asashio	Thornycroft	1902											
Ikadsuchi	Yarrow ..	1898	220·0	20 6	9·6	2	311	6,000	31	1 12-pr., 5 6-prs.	2	55	95
Akebono	Yarrow ..	1899											
Sazanami	Yarrow ..	1899											
Oboro*	Yarrow ..	1899	220·3	20·6	9·6	2	311	6,000	31·62	1 12-pr., 5 6-prs.	2	..	90
Niji	Yarrow ..	1899	220·3	20.6	9·6	2	308	6,000	31 15	1 12-pr., 5 6-prs.	2	..	90
Kasumi	Yarrow ..	1902	220·3	20·6	9·6	2	335	6,000	31	1 12-pr., 5 6-prs.	2	..	..
Asagiri	Yokosuka ..	1902	220·3	20·6	9·6	2	374	6,000	29	1 12-pr., 5 6-prs.	2	..	..
Murasame	Yokosuka ..	1902											
Yamahiko	Port Arthur	1903	196·9	18·4	11·5	2	250	6,000	27	1 12-pr., 5 3-prs.	2	..	80
Fumizuki	Port Arthur	1903											
Satsuki	St. Petersburg	1902											
Hatsushima	Yokosuka ..	1905	220·3	20·6	9·6	2	374	6,000	29	6 12-pr.	2	..	..
Yayoi	Yokosuka ..	1905											
Kisaragi	Yokosuka ..	1905											
Hibiki	Yokosuka ..	1906											
Wakaba	Yokosuka ..	1905											
Hatsuyuki	Yokosuka ..	1906											
Kamikase	Yokosuka ..	1905											
Ariake	Yokosuka ..	1905											
Fubuki	Yokosuka ..	1905											
Arare	Yokosuka ..	1905											
Yunagi	Maizuru ..	1906											
Oite	Maizuru ..	1905											
Asakase	Kobe	1905											
Harukase	Kobe	1905											
Shigure	Kobe	1906											
Hatsuharu	Kobe	1906											
Yuguri	Sasebo	1905											
Yudachi	Sasebo	1906											
Mikadzuki	Sasebo	1906											
Nowake	Sasebo	1906											
Uschio	Kure	1905											
Nenohi	Kure	1905											
Shiratsuyu	Nagasaki ..	1906											
Shirayuki	Nagasaki ..	1906											

Japan—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Feet.	Feet	Feet.		Tons.		Knots.				Tons.
Destroyers—*contd.*													
Matsukase	Nagasaki	1906											
Shirotaye	Nagasaki	1906											
Asatsuyu	Osaka	1907											
Hayakase	Osaka	1906											
Kikutsuki	Uraga	Bldg.											
Minatsuki	Uraga	Bldg.	220·3	20·6	9·6	2	374	6,000	29	6 12-prs.	2	70	90
Nagatsuki	Uraga	1907											
Utsuki	Uraga	1907											
Isonami	Yokosuka	1909											
Uranami	Yokosuka	1909											
Ajanami	Yokosuka	1909											
Kaifu	Maizuru	1909											
Umikaze	Nagasaki	1910											
Yamakase	..	1911	..	..	..	..	1200	20,500	35	2 4 7-in., 5 3-in.	3	123	..
Sakura	Kure	1912											
Tashibana	Kure	1912	..	..	..	..	900	18,000	33	2 3 9 in., 4 12-pr.	2	..	..
First Class—													
Hayabusa	Normand	1898											
Kasasagi	Normand	1899											
Manadzuru	Normand	1899	147·7	16·0	8·2	2	150	4,200	30	1 6-pr., 2 3-prs.	3	26	30
Chidori	Normand	1900											
Shirataka	Elbing	1899											
Aoataka	Kure	1903											
Hato	Kure	1903											
Hibari	Kure	1903											
Kari	Kure	1903											
Kiji	Kure	1903											
Tsubame	Kure	1903	147·7	16·0	8·2	2	150	4,200	27	1 6-pr., 2 3-prs.	3	26	30
Hashitaka	Kawasaki	1902											
Kamone	Kure	1904											
Otori	Kawasaki	1904											
Sagi	Kure	1902											
Uzuri	Kure	1902											
Second Class—													
2 boats	Kobe	1901	..	..	..	..	83	..	..	..	..	..	..
10 boats	Yarrow	1900	152·6	15·3	7·9	..	..	1,900	27	2 3-prs	3	..	36
16 boats	Elbing	1891–9	..	..	..	..	..	..	..	..	..	..	..
1 boat (No. 24)	Normand	1891	118	13·1	6·9	1	80	1,200	23	2 1-prs.	2	21	10
2 boats	Normand	1898	121·4	13·6	8·6	1	86	1,800	27	1 3-pr.	2	..	10
Submarines—													
5 boats	Fore River, U.S.A.	1904–5	65	12	..	..	120	..	8	..	1	..	..
2 boats	Japan	1906	..	..	..	..	60·80	..	..	..	1	..	..
2 boats	Vickers	1908	135	13·5	..	..	326	..	14	..	2	..	..
6 boats	Kawasaki	1911 & Bldg.	..	..	..	..	..	..	..	..	..	..	..

Netherlands.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Wolf, Fret (1909) .. Bulhond, Jakhals (1910) Hermelyn, Lynx, Panter, Vos (1911)	Flushing ..	1910 Bldg.	230	20·6	..	2	480	7,500	30	4 12-pr., 4 M.	2	84	80
FIRST CLASS—													
Ardjoeno	Yarrow ..	1886	125	13	6	1	83	800	21	2 1-prs.	2	16	10
Batok	Amsterdam	1887	125	13	6·9	1	83	725	20	2 1-prs.	2	16	10
Cycloop	Amsterdam	1887	125	13	6·9	1	83	680	20	2 1-prs.	2	16	10
Dempo	Amsterdam	1887	125	13	6·9	1	83	760	20	2 1-prs.	2	16	10
Empong	Yarrow ..	1888	128	13	6·2	1	91	1,100	24·1	2 1-prs.	3	16	15
Foka	Amsterdam	1888	128	13	6·2	1	90	1,000	22·1	2 1-prs.	3	..	..
Goentoer	Amsterdam	1888	128	13	6·2	1	90	950	21	2 1-prs.	3	..	..
Habang	Amsterdam	1888	128	13	6·2	1	90	930	21·7	2 1-prs.	3	..	..
Idjen	Amsterdam	1889	128	13	6·2	1	90	840	20·6	2 1-prs.	3	..	..
Krakatau	Amsterdam	1889	128	13	6·2	1	90	750	19·1	2 1-prs.	3	..	..
Scylla	Yarrow ..	1900	130	13·6	6·0	1	77	1,200	24·3	2 1-prs.	3	18	20
Hydra	Yarrow ..	1900	130	13·6	6·0	1	77	1,200	24·4	2 1 prs.	3	18	20
Ophir	Yarrow ..	1901	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Pangrango	Yarrow ..	1901	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Rindjani	Yarrow ..	1901	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Smeroe	Fijenoord ..	1904	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Tangka	Fijenoord ..	1904	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Wajang	Fijenoord ..	1904	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Minotaurus, Python	Flushing ..	1904	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Zeeslang .. .. .. Krokodil .. .. .. Draak .. .. .. Sfinx .. .. Scylla	Flushing ..	1905	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Meijndert Jentjes .. Johan van Brakel .. Van de Rijn .. .. Willem Willemsze ..	Flushing, Rotterdam, & Fijenoord	1904	154·3	16·5	7·9	1	144	2,000	25	2 3-prs.	3	24	40
Roemer Vlacq .. Pieter Constant .. Jacob Cleydijk .. Janssen de Haan ..	Do. ..	1906	154·3	16·5	7·9	..	144	2,000	26	2 3-prs.	3	24	40

All the Poplar destroyers have Yarrow water-tube boilers, and the later ones are fitted for the consumption of oil fuel. Four torpedo-boats of the Ophir class improved, 180 tons, 2 12-prs., are to hand, and 8 others are to be built (1913).

Submarine boat, No. 1 (120 tons). Nos. 2 and 3, 132 150 tons, 11–8 knots, 2 tubes. Nos. 4 and 5 380 tons, 151 ft. 6 in. long, 16 knots (surface), 11 knots (submerged) speed. A boat is being built for the East Indies, 150 tons (submerged). 105 ft. long, 10 ft. beam, 300 h.p. (Diesel), and 300 h p. (electric), 16 knots (surface), 11 knots (submerged speed), 2 tubes. A 350-ton, 16 knot, submarine for the Dutch Indies, is being built, and two others are to be put in hand (1913), also eight 200-ton boats for home service.

Portugal.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons
Tejo	Lisbon ..	1901	..	..	..	..	..	7000	25 5	1 4-in., 5 M.	2	..	..
Douro	Lisbon ..	Bldg.	240	23·6	..	..	700	11,000	27	1 4-in., 2 12 pr.	2	..	..

There are four obsolete torpedo-boats and three are building in France. Submarine Espadarte, 245–300 tons, 13 knots, built at the F.I.A.T. San Giorgio Yard, Muggiano; another in hand.

Norway.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Valkyrien	Elbing ..	1896	190	24·3	9·3	1	374	3,300	23·2	2 12-pdrs. 4 1-pdrs.	2	59	90
Draug .. .. .. Troll..	Christiania.. Christiania..	1908 Bldg.	226	25·0	..	2	550	7,500	27·0	6 12-pdrs.	3	71	95
FIRST CLASS—													
Varg (8), Raket (9)	Christiania..	1894	111·5	12·4	..	1	43	..	..	..	2	..	..
Hval, Delfin, Hai (3 boats)	Elbing ..	1896	128·0	15·0	6·9	1	84	1,100	24·5	2 1·4-in. Q.F.	2	..	..
Storm, Brand, Trods	Christiania ..	1899	128·0	15·0	..	1	84	1,100	23	2 1·4-in. Q.F.	2		
Laks, Sild, Sael, Skrei	Christiana ..	1901	128·0	15 0	6·9	1	84	11,000	23	2 1·4-in.	2	..	..
Kjeck, Hvas, Dristig, Kvik, Djerv, Blink, Glint, Hauk, Falk	Christiana ..	1898 1903	111·5	14·5	6 3	1	65	650	19	2 1·4-in.	2	..	..
Skarv, Teist, Lom, Jo, Grib	Christiana ..	1906–7	134·5	14·9	..	1	100	1,700	25·0	2 3-pr.	..	..	..
Ravn, Orn	Christiana ..	1903	119	14·9	6·4	1	73	1,035	22·5	2 1·4-in.	2	14	13
SUBMARINE—													
Kobben	Germania Kiel	1909	131·6	14·9	..	..	205	440	12	..	3	..	..
Nos. 2, 3, 4, 5.. ..	Germania Kiel	1912 & Bldg.					255	250	9				

Provision made for a destroyer, and a torpedo-boat, Skarv class, is in hand.

Roumania.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
FIRST CLASS—			Feet.	Feet	Feet.		Tons.		Knots.				Tons.
Naluka	**Havre**	1888	120·7	11·3	6·9	1	56	578	21	1 1-pr. rev.	2	..	12
Sborul	**Havre**	1888	120·7	11·3	6·9	1	56	578	21	1 1-pr. rev.	2	..	12
Smeul	**Havre**	1888	120·7	11·3	6·9	1	56	578	21	1 1-pr. rev.	2	..	12

8 100 ft. Torpedo Vedette Boats built by the Thames Iron Works. 4 built by Schichau, 1904, Vedea, Argosul, Trotosul, Teleorman, for the Danube.

Russia.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
BALTIC.													
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Kondratenko, Okhotnik, Pogranitschnik, Siberskij-Strelok ..	Abo and Helsingfors	1905	250·3	27·0	8·9	2	625	7,300	25–26	2 12-pdrs. 6 6-pdrs.	3	100	191
Amuretz, Gaidamak, Ussurietz, Vsadnik .	Kiel (Germany)	1905 1906	232·9	23·7	7·9	2	560	6,500	25–26	2 12-prs. 6 6-prs.	3	98	180
Emir Bukharsky, Dobrovoletz Finn, Moskvityanin.. ..	Helsingfors	1905	238	27·0	8·6	2	580	6,500	25–26	2 12-pdrs. 6 6-pdrs.	3	98	134
Donskoi - Kasak, Kasanetz, Sabaikaletz, Steregushtshi, Strashny, Trukhmenetz - Stavropolski, Ukraina, Voiskovoi	Riga	1904 1906	239·9	23·7	7·6	2	508	6,200 7,020	25–27	2 12-pdrs. 4 6-pdrs.	2	90	50 120
Prytki	Poplar.. ..	1895	190	18·6	7·0	2	240	4,400	29.7	1 12-pr, 3 3-pr	2	..	..
Revy, Retivy, Ryany, Rezviyi, Prosorlivy, Ridny, Posluchny, Protchny, Poratsuchtchi, Podvitsny ..	Abo, Ishora & Nevsky ..	1898	196·9	18·4	11·5	2	240	3,800	27	1 12-pr, 3 3-pr	2	55	53

Russia—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
BALTIC.			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
DESTROYERS—*contd.*													
Bravi, Vidny, Bodry	Nevsky and Ishora ..	1900–2	196 9	18·4	11·5	2	350	6,000	27	1 12-pr, 5 3-pr	3	62	80
Grozni, Grosiashtchi	St. Petersburg	1904	196·9	18·4	11·5	2	350	6,000	27	1 12-pr, 5 3-pr	3	62	80
Tverdy, Totschny, Trevozhny	Abo	1905	196·9	18·4	11·5	2	240	6,000	27	1 12-pr, 5 3-pr	3	62	80
Iskousny, Ispolnitelni, Kriepky, Legky	La Seyne ..	1905	185·9	21·0	7·5	2	324	5,600	26	1 12-pr, 5 3-pr 2 M	2	60	30 100
Lovki, Letutshi, Lichoi	Havre (Normand)	1905	185·8	21·0	7·5	2	324	5,600	27·5	1 12-pr, 5 3-pr 2 M	2	60	30 100
Boievoi, Editelny, Burni, Vnimatelni, Vnushitelni, Vynoslivny, Sergieff, Yurasovsky, Sviereff, Dmitrieff	Elbing Schichau	1905–6	203·9	23·0		2	365	6,500	28		3		95
Silni, Storoshevoi, Stroiny, Rasyashtshy, Rastoropny, Burakoff, Dyelni, Dostoiny, Deyatelni, Myetky, Molodetsky, Moshtshny, Malieieff Anastosoff	St. Petersburg and Ochta	1905 1907	185·9	21·0	7·5	2	335 56	5,600	26	1 12-pr, 5 3-pr 2 M	2	60	30 100
Novik	St. Petersburg	1912	336·6	31·3	8·7	..	1200	30,000	36·2	4 4-in., 4 M	4	..	..
SUBMARINES—													
Delfin	St. Petersburg	1903	65	12	..	..	115–150	..	6	..	3	..	..
Graf Sheremetieff, Kassatka, Nalim, Skat	St. Petersburg	1904	65	12	..	..	150–200	100-60	8-6	..	4	..	..
Som, Shtshuka ..	St. Petersburg	1904	65	12	..	..	120	160	9·5–7	..	2	..	..
Assiotr, Bytschok, Kefal, Paltus, Pletva	St. Petersburg	1905	70	13	..	..	135–175	400	10–7	..	3	..	..
Bialuga, Pescar, Sterliad	St. Petersburg	1904	66	13	..	..	120	160	9–7	..	2	..	..
Sig	St. Petersburg	1904	66	13	..	..	135–175	..	10–7	..	3	..	..
Makrel, Otun .. .. Potschovy	St. Petersburg	1907 1908	110	..	..	..	150-200	100–60	8-6	..	6	..	..
Alligator, Drakon, Kaiman, Krokodil..	St. Petersburg	1908	132	14·2	..	..	450–500	..	12–10	..	2	..	..
Akula	St. Petersburg	1908	183·9	..	..	..	370	..	13	..	4	..	..
Minoga	St. Petersburg	1908	117	..	..	..	126	..	..	..	2	..	..
Unnamed..	St. Petersburg	Bldg.	..	..	..	..	500	..	16–9·5	..	..	..	..
BLACK SEA.													
DESTROYERS—													
Baranoff, Shestakoff, Saken, Sazarenny	Nicolaieff ..	1907–8	241·6	27·0	7·9	2	614	6,500	25	6 12-pdrs.	3	90	200
Zavidni, Zavetni, Zharki, Zhutki, Zhivoi, Zhivulka, Zhivutshtshy ..	Nicolaieff ..	1903-4	210	21·2	7	2	350	5,500	27	1 12-pr, 5 3-pr	2	..	..
Stremitelini, Strogi, Smetlivy, Svirepy	Abo	1901	190·4	18·5	11·5	2	240	3,800	27	1 12-pr, 3 3-pr	2	..	60
Pushkin, Zorki, Zvonki	Nicolaieff ..	1903	210	21·2	7	2	350	5,500	27	1 12-pr, 5 3-pr	2	..	..
Bespokoiny .. .. Bystry, Dersky, Gnievny, Gromky Pospieschny, Pronsitelny, Pilky, Stshastlivy	Nicolaieff .. Nevsky, Putiloff, &c.	1912 and Bldg.	..	..	..	..	1,050	25,000	31	3 4-in.	5	93	..
SUBMARINES—													
Lossos, Shudok ..	Nikolaieff ..	1907	66	13	..	..	120	..	9–7	..	2	..	..
Karp, Karas	Germania ..	1907	130	..	..	..	200–240	600	12-10	..	1	..	..
Morsh, Nerpa, Tiulen	St. Petersburg	Bldg.	163·6	17·6	..	..	460–600	1200–800	15–11·5	..	9	..	..
Kashalot, Kit, Narval	St. Petersburg	Bldg.	..	..	..	..	..	..	..	..	..	..	..
Krab (mine-layer)..	Nicolaieff ..	1912	171	..	..	..	500–700	..	..	..	2	..	..
FAR EAST.													
DESTROYERS—													
Bespochtchadni, Bestrachni, Beschumni (3 boats)	Elbing ..	1899	196·9	18·4	11·5	1	350	6,000	27	1 12-pr, 5 3-pr	2	..	..
Grozovoi, Vlastni ..	Havre (F. & C.)	1900–2	186·0	20·8	10·3	2	300	5,000	28	1 12-pr, 5 3-pr	2	..	80
Boiki	Nevsky ..	1900	196·9	18·4	11·5	1	350	6,000	28	1 12-pr, 5 3-pr			

About 12 of the Baltic submarines are for the Far East; 18 additional boats are to be built. Nine destroyers, 450 tons, are in hand, and the programme for 1913–17 includes 36 additional of the class.

Spain.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
DESTROYERS—													
Terror	Clydebank ..	1896	220	22	5·6	2	300	6,000	28	2 12-pr. 2 6-pr. 21-pr.	2	67	100
Audaz													
Osado	Clydebank ..	1897	225	25·6	5·8	2	400	7,500	30	2 14-pr. 2 6-pr. 21-pr.	2	70	90
Proserpina													
Bustamente	Cartagena ..												
Villamil	Cartagena ..	Bldg.	220	22	7·5	..	370	6,250*	28	5 6-pr.	2	..	..
Requescens	Cartagena ..												
FIRST CLASS—													
24 boats	Cartagena ..	Bldg. Pro.	165	16·6	..	..	180	3,750*	26	3 3-pr.	3	..	..
Azor	Poplar.. ..	1887	134·5	14	6	1	108	1,600	24	4 3-pr.	3	23	25
Halcón	Poplar.. ..	1887	134·5	14	..	1	108	1,600	24	4 3-pr.	3	23	25

Azor and Halcón re-boilered by Yarrow (water-tube). * Turbines and Normand type boilers.

Sweden.

TORPEDO-BOATS.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
DESTROYERS—													
Mode	Yarrow ..	1902	220·3	20 6	8·9	2	400	6,800	32·4	1 12-pr. 5 6-prs.	2	55	95
Magne	Thornycroft	1905											
Wale..	Malmo ..	1906											
Ragnar	Malmo ..	1909											
Sigurd	Gothenburg	1909	216·9	20·8	8·2	2	430	7,200	30·0	2 12-prs. 4 6-prs.	2	63	90
Vidar	Malmo ..	1909											
Hugin	Gothenburg	1909											
Munin	Malmo ..	1910											
FIRST CLASS—													
Komet	Elbing ..	1896	128	15·9	6·11	1	92	1,056	23·0	2 1·9-in. Q.F	2	16	17
Blixt..	Carlskrona..	1898	128	15·9	6·11	1	92	1,260	23·5	2 1·9 in Q.F.	2	18	17
Meteor	Carlskrona..	1899	128	15·9	6·11	1	92	1,330	23·8	2 1·9-in. Q.F	2	18	17
Stjerna	Carlskrona..	1899	128	15·9	6·11	1	92	1,250	23·4	2 1·9-in. Q.F.	2	18	17
Orkan	Carlskrona..	1900	128	15·9	6·11	1	92	1,250	23·5	2 1·5-in. Q.F.	2	18	17
Vind	Carlskrona..	1900	128	15·9	6·11	1	92	1,250	23·5	2 1·5-in. Q.F.	2	18	17
Bris	Carlskrona..	1900	128	15·9	6·11	1	92	1,250	23 5	2 1·5-in. Q.F.	2	18	17
Virgo	Carlskrona..	1902	128	15·9	6·11	1	92	1,250	23·5	2 1·5-in. Q F.	2	18	17
Mira	Carlskrona..	1902	128	15·9	6·11	1	92	1,250	23·5	2 1·5-in. Q.F.	2	18	17
Orion													
Sirius	Carlskrona .	1903	128	15·9	6·11	1	92	1,250	23·5	2 1·5-in. Q.F.	2	18	17
Kapella													
Pleiad	Normand ..	1905	125	15	6·6	1	96	1,900	26	2 1·5-in. Q.F.	2	18	20
Vega	Carlskrona..	1910	125	17·5	8·6	1	105	1,900	25	1 6-pr. 1 1·4-in.	2	18	20
Vesta													
Spica, Astrea, Iris, Thetis	Bergsund and Gothenburg	1910	125	17·5	8·6	1	105	1,900	.	1 6-pr. 1 1·4-in.	2	18	20
Altair													
Antares	Stockholm ..	1908	128	17·5	8·6	..	110	2,000	25	2 6-prs.	2	18	20
Argo													
Arcturus													
Perseus, Polaris ..	Bergsund ..	1912											
Regulus, Rigel ..	Stockholm ..	Bldg.	128	17·5	8 6	1	110	2,000	25	12 6-pr.	2	18	20
A, B, C, D	Carlskrona & Gothenburg												
SECOND CLASS—													
No. 75	Stockholm ..	1892	100·5	11·6	6·3	1	49	460	18·9	1 mach.	2	14	9
No. 77	Carlskrona..	1891	100·5	11·6	6·3	1	49	460	18·9	1 mach.	2	14	9
No. 79	Stockholm ..	1902	104·0	12·5	6·1	1	49			1 1·5-in. Q.F	2	14	...
No. 81	Stockholm ..	1902	104·0	12·5	6·1	1	49			1 1 5-in Q.F	2	14	...
No. 83	Stockholm ..	1903	104·0	12·5	6·1	1	49			1 1 5-in. Q.F.	2	14	...
No. 85	Stockholm ..	1903	104·0	12·5	6·1	1	49			1 1·5-in. Q.F	2	14	...
THIRD CLASS—													
Nos. 141, 143, 145, 147, 149 (5 boats) ..	Stockholm ..	1879 1890	55·0	10·7	4·1	2	21	80	10	..	2	..	1·5
SUBMARINES—													
Enroth	Stockholm ..	1902	82·0	13·0	11·6	2	146	100	12-11	..	1	.	.
Hajen	Stockholm ..	1903	65·0	11·6	..	..	120	200	10–7	..	..	..	..
Hvalen	Muggiano ..	1908	139·6	14·2	6·9	..	185–235	750	15–7½	..	2	15	..
Three	Stockholm ..	1911	136·6	14·2	6 9	..	185–535	750	15–7½	..	2	15	...

Three additional submarines are in hand, two at Malmo (F.I.A.T. type) and one by the Bergsund firm.

Turkey.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons
Berk-Efshan	Kiel	1894	187	21·6	..	2	270	1,200	25	6 1-pr. revs.	2	...	...
Tajjar	Kiel	1894	187	21.6	..	2	270	..	25	6 1-pr. revs.	2	...	...
Samsoun .. .. . / Basra.. .. .. .. / Tassos .. .. . / Yar-Hissar	Bordeaux ..	1907-8	184·9	19·6	9·6	2	280	..	28	1 9-pr. / 6 3-pr.	2	..	26
Jadighiar-i-Millet .. / Muavenet-i-Millet,.. / Mahabet-i-Watan .. / Nuhum-i-Hamijet ..	Elbing (Schichau)	1909	236·6	25·6	12·3	2	610	14,000	35	2 3·4 in. 2 M.	3	..	160
FIRST CLASS—													
Ac-Hisar	Sestri Ponente	1904	165·8	18·6	4·5	..	165	2,200	27				
Urffa, Tokat, Deradj, Kulahia, Moesul..	Sestri Ponente	1906	165·8	18·6	4·5	..	165	2,200	24				
A. B...	Sestri Ponente	1901	166	18·6	4·0	2	145	2,400	26	2·1 pr.	2	..	16

Ten destroyers are intended to be purchased or built.

United States.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament. Guns.	Torpedo Tubes.	Complement.	Maximum Coal Capacity.
DESTROYERS—			ft. in.	ft. in.	ft. in.		Tons.		Knots.				Tons.
Smith	Philadelphia	1909	289 0	26 0	8 0	3	700	10,362*	29·5 t.	5 3-in., 2 M.	3 18-in.	89	285
Lamson	Philadelphia	1909	289 0	26 0	8 0	3	700	10,000*	29·5			89	285
Preston	Camden, N.J.	1909	289 0	26 0	8 0	3	700	10,000*	28			89	270
Flusser .. .	Bath, Me. ..	1909	289 0	26 0	8 0	3	700	11,842*	30·41 t.			89	295
Reid	Bath, Me. ..	1909	289 0	26 0	8 0	3	700	12,734*	31·82 t.			89	295
Paulding	Bath, Me. ..	1910	289 0	26 1¼	8 4	3	742	12,000*	29·50			89	210
Drayton	Bath, Me. ..	1910	289 0	26 1¼	8 4	3	742	12,000*	29·50			89	210
Roe	Newport	1909	289 0	26 1¼	8 4	3	742	12,000*	29·50			89	210
Terry	News, Va.	1909	289 0	26 1¼	8 4	3	742	12,000*	29·50			89	210
Perkins	Quincy, Mass.	1910	289 0	26 1¼	8 4	2	742	12,000†	29·50			89	216
Sterrett	Quincy, Mass.	1910	289 0	26 1¼	8 4	2	742	12,000†	29·50			89	216
McCall	Camden, N.J.	1910	289 0	26 1¼	8 4	3	742	12,000*	33·0			89	210
Burrows	Camden, N.J.	1910	289 0	26 1¼	8 4	3	742	12,000*	29·50			89	210
Warrington ..	Philadelphia	1910	289 0	26 1¼	8 4	2	742	12,000‡	30			89	210
Mayrant	Philadelphia	1910	289 0	26 1¼	8 4	2	742	12,000‡	29·50			89	210
Monaghan ..	Newport News	1911	289 0	26 1¼	8 4	3	900	12,000*	30			89	210
Trippe	Bath, Me. ..	1911	289 0	26 1¼	8 4	3	900	12,000*	29·50			89	210
Walke	Quincy, Mass.	1911	289 0	26 1¼	8 4	2	900	12,000†	29·50			89	216
Ammen	Camden, N.J.	1911	289 0	26 1¼	8 4	3	900	12,000*	29·50			89	210
Patterson	Philadelphia	1910	289 0	26 1¼	8 4	3	900	12,000*	30			89	210
Bainbridge ..	Philadelphia	1901	245 0	23 7	6 6	2	420	8,000	28·45	2 14-pr., 5 6-pr..	2	64	139
Barry	Philadelphia	1902	245 0	23 7	6 6	2	420	8,000	28·13	2 14-pr., 5 6-pr..	2	64	139
Chauncey.. ..	Philadelphia	1901	245 0	23 7	6 6	2	420	8,000	28·64	2 14-pr., 5 6-pr.	2	64	139
Dale	Richmond ..	1900	245 0	23 7	6 6	2	420	8,000	28	2 14-pr., 5 6-pr.	2	64	139
Decatur	Richmond ..	1900	245 0	23 7	6 6	2	420	8,000	28·10	2 14-pr., 5 6-pr.	2	64	139
Hopkins	Wilmington	1902	244 0	24 6	6 0	2	408	8,456	29·02	2 14-pr., 5 6-pr.	2	64	150
Hull	Wilmington	1902	244 0	24 6	6 0	2	408	9,119	28·04	2 14-pr., 5 6-pr.	2	64	150
Lawrence.. ..	Quincy, Mass.	1900	242 3	22 3	6 2	2	400	8,400	28·41	2 14-pr., 5 6-pr.	2	64	115
Macdonough ..	Quincy, Mass.	1901	242 3	22 3	6 2	2	400	8,400	28·03	2 14-pr., 5 6-pr.	2	64	115
Paul Jones ..	San Francisco	1900	245 0	23 7	6 6	2	420	8,000	28·91	2 14-pr., 5 6-pr.	2	64	139
Perry	San Francisco	1900	245 0	23 7	6 6	2	420	7,950	28·32	2 14-pr., 5 6-pr.	2	64	139
Preble	San Francisco	1901	245 0	23 7	6 6	2	420	7,370	28·03	2 14-pr., 5 6-pr.	2	64	139
Stewart	Morris Heights	1902	245 0	23 7	6 6	2	420	8,000	29·69	2 14-pr., 5 6-pr.	2	64	139
Truxtun	Baltimore ..	1901	248 0	23 3	6 0	2	433	8,300	29·58	2 14-pr., 5 6-pr.	2	64	232
Whipple	Baltimore ..	1901	248 0	23 3	6 0	2	433	8,300	28·24	2 14-pr., 5 6-pr	2	64	232
Worden	Baltimore ..	1901	248 0	23 3	6 0	2	433	8,300	29·56	2 14-pr., 5 6-pr.	2	64	232

* Parsons turbines. † Curtis turbines. ‡ Zoelly turbines.

United States—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament. Guns.	Torpedo Tubes.	Complement.	Maximum Coal Capacity.
DESTROYERS—*continued.*			ft. in.	ft. in.	ft. in.		Tons.		Knots.				
Beale													
Fanning													
Henley	Quincy, Mass.	1911	289 0	26 1¼	8 4	3	900	12,000*	29 50	5 3-in., 2 M.	3 18-in.	89	210
Jarvis													
Jewett													
Aylwin	Philadelphia	1912											
Balch	Philadelphia	1912											
Benham	Philadelphia	Bldg.											
Cassin	Philadelphia	Bldg.											
Cummings ..	Bath	Bldg.	300 0	30 6	9 3	2	1010	16,000	29½	5 4-in., 2 M.	3	98	300
Downes	Bath	Bldg.											
Duncan	New York ..	Bldg.											
Parker	Quincy, Mass.	Bldg.											
SEA-GOING—													
Bagley	Bath	1900	157 0	17 0	4 7	2	167	4,200	29·15	3 3-pr.	3	29	..
Bailey	Morris Heights	1899	205 0	19 0	6 0	2	235	5,600	30·20	4 6-pr.	2	..	20
Barney	Bath	1900	157 0	17 0	4 7	2	167	4,200	29·04	3 3-pr.	3	29	..
Biddle	Bath	1900	157 0	17 0	4 7	2	167	4,200	28·57	3 3-pr.	3	29	..
Blakely	Boston ..	1902	175 0	17 6	4 8	2	165	3,000	25·58	3 3-pr.	3	29	70
De Long	Boston	1901	175 0	17 6	4 8	2	165	3,000	25·52	3 3-pr.	3	29	70
Du Pont	Bristol, R.I.	1897	175 0	17 8	4 8	2	165	..	28·58	4 1-pr.	3	32	76
Rowan	Seattle, Wash.	1898	170 0	17 0	5 11	2	182	3,200	27·07	4 1-pr.	3	32	60
Shubrick	Richmond ..	1899	175 0	17 6	4 8	2	165	3,375	26·07	3 3-pr.	3	29	70
Stockton	Richmond ..	1899	175 0	17 6	4 8	2	165	3,275	25·79	3 3-pr.	3	29	70
Tingey	Baltimore ..	1902	175 0	17 6	4 8	2	165	3,000	24·94	3 3-pr.	3	29	70
Wilkes	Morris Heights	1901	175 0	17 6	4 8	2	165	3,495	25·99	3 3-pr.	3	29	70
Winslow	Baltimore ..	1897	160 0	16 1	5 0	2	142	2,000	24·82	3 1-pr	3	24	44
Cushing	Bristol, R.I.	1890	138 9	14 3	4 11	2	105	1,720	22·50	3 1-pr.	3	23	36
Dahlgren	Bath	1899	147 0	16 4	4 7	2	146	4,200	30	4 1-pr.	2	..	32
Davis	Portland, Ore.	1898	146 0	15 4	5 4	2	132	1,750	23·41	3 1-pr.	3	..	..
Farragut	San Francisco	1898	213 6	20 8	6 0	2	273	5,878	30·13	4 6-pr.	2	..	76
Fox	Portland, Ore.	1898	146 0	15 4	5 4	2	132	1,750	23·13	3 1-pr.	3	..	..
Goldsborough ..	Portland, Ore.	1902	194 8	20 5	5 0	2	247·5	6,000	27·40	4 6-pr.	2	..	131
Morris	Bristol, R.I.	1898	138 3	15 6	4 1	2	105	1,750	24	3 1-pr.	3	..	28
Somers	Schichau, Eibing ..	1898	149 3¾	17 5	..	2	145	1,900	17·5	..	..	...	..
Stringham ..	Wilmington	1899	225 0	22 0	6 6	2	340	7,200	25·33	7 6-pr.	2	..	120
T. A. M. Craven	Bath	1899	147 0	16 4	4 7	2	146	4,200	30	4 1-pr.	2	..	32
Thornton	Richmond	1900	175 0	17 6	4 8	2	165	3,000	24·88	3 3-pr.	3	29	70
THIRD CLASS—													
Gwin..	Bristol, R.I.	1897	99 6	12 6	3 3	1	46	850	20·88	1 1-pr.	2	..	8
Mackenzie ..	Philadelphia	1898	99 3	12 9	4 3	1	65	850	20	1 1-pr.	2	..	15·3
McKee	Philadelphia	1898	99 3	12 9	4 3	1	65	850	19·82	2 1-pr.	2	..	..
Talbot	Bristol, R.I.	1897	99 6	12 6	3 3	1	46	850	21·15	1 1-pr.	2	..	8·8
SUBMARINE—													
A1, A2	Elizabethport	1902	63 4	11 9	..	1	120	160	7—8	..	1	..	..
A3	San Francisco	1902	63 4	11 9	..	1	120	160	7—8	..	1	..	..
A4	Elizabethport	1901	63 4	11 9	..	1	120	160	7—8	..	1	..	..
A5	San Francisco	1902	63 4	11 9	..	1	120	160	7—8	..	1	..	..
A6, A7	Elizabethport	1901	63 4	11 9	..	1	120	160	7—8	..	1	..	..
B1-B3	Quincy, Mass.	1909	80 6	13 0	..	..	170		8½—10				
C1-C5	Quincy, Mass.	1906 9	106 0	..	..	..	273						
D1 D3	Quincy, Mass.	1909	..	..	..	..	278–340	500	..	..	2	..	..
E1, E2	Quincy, Mass.												
F1, F2	San Francisco												
F3, F4	Seattle ..	Bldg. 1911	160·0	13 0	..	..	525	..	9½—14	..	6	..	..
G1-G3	Newport News												
G4	Philadelphia												
H1, 2, 3†	..	1910											
K5, 6, 7, 8 ..	Quincy, &c...	Bldg.	..	..	..	..	500	..	22	..	..	..	..

Destroyers O'Brien, Nicholson, Winslow, McDougal, Cushing, Ericsson provided for 1912; 1050 tons, 17,000 H.P., four 4 in. tubes, otherwise as Alwyn class. Nine additional submarines ordered, Fore River Company, Quincy, Mass.

* Parsons turbines. † Sub-surface destroyers.

BRITISH AND FOREIGN AIRSHIPS.

Great Britain.

Name.	Make.	Date.	Displacement.	Length.	Diameter.	Motors.	Total H.P.	Useful Load.	Speed, knots.	Speed, m.p.h.	Remarks.
			tons	ft.	ft.			lb.			
					BATTLE AIRSHIP. (Rigid.)						
Naval No. 1	Vickers	1911	21	512	48	2 Wolseley	400	10,000	41·36	47	Wrecked at Barrow; not yet repaired.
					MINE-LAYING AND SCOUTING AIRSHIPS. (Semi-rigid.)						
Delta	R.A.F.	1912	5·3	180	42	2 White and Poppe	180	5,000	38·7	44	Army.
Gamma	R.A.F.	1910	3·4	152	35	2 de Haviland	60	2,500	26·4	30	Army.
Beta	R.A.F.	1909	1·2	104	27	1 Clerget	50	700	32·5	37	Reconstructed.
Naval No. 2	Willows	1912	·68	..	..	1 Anzani	35	250	26·4	30	
Building:—											
Naval No. 3	Astra	1913	8	..	..	2 Chenu	400	6,000	37	42	
Naval No. 4	Parseval	1913	8·5	295	49	2 Maybach	370	7,500	37	42	

Germany.

Name.	Make.	Date.	Displacement.	Length.	Diameter.	Motors.	Total H.P.	Useful Load.	Speed, knots.	Speed, m.p.h.	Remarks.
			tons.	ft.	ft.			lb.			
					BATTLE AIRSHIPS.						
Z 1	Zeppelin	1906	12	446	38	2 Daimler	230	5,500	31·7	36	Still efficient.
Z 2	,,	1911	18	460	46	3 Maybach	450	10,500	42·4	48	
Z 3	,,	1912	20	490	46	3 ,,	510	12,300	44·2	50	
Z 4	,,	1913	21	430	47	3 ,,	510	1,230	45	51	
L 1	,,	1912	22	525	49	3 ,,	510	14,000	45·7	52	Naval. 2 1-pdr., 4 Maxims.
Ersatz Z 1	,,	1912	18·5	485	46	3 ,,	450	11,500	43·1	49	
SL	Schütte-Lanz	1912	19	430	60	2 Daimler	540	11,000	40·5	46	
Victoria Luise	Zeppelin	1912	18·5	485	46	3 Maybach	450	11,500	43·1	49	Privately owned.
Hansa	..	1912	18·5	485	46	3 ,,	450	11,500	43·1	49	Privately owned.

Building.—Two Zeppelins of about 20 tons for the Army, two of about 27 tons for the Navy, and one Schütte-Lanz for the Army; also one Zeppelin of about 22 tons for a private firm. It is reported that two more Zeppelins have been ordered for the Navy.

MINE-LAYING AND SCOUTING AIRSHIPS.

Name.	Make.	Date.	Displacement.	Length.	Diameter.	Motors.	Total H.P.	Useful Load.	Speed, knots.	Speed, m.p.h.	Remarks.
P 1	Parseval	1908	4	195	34	1 Daimler	85	3,300	28	32	
P 2	,,	1912	8	262	46	2 ,,	300	5,600	34·3	39	
P 3	,,	1911	10	282	49	2 N.A.G.	400	7,500	37	42	
P 4	,,	1912	10	282	49	2 Daimler	400	7,500	37	42	
SS	Siemens-Schuckert	1911	15	387	46	2 ,, / 2 Benz	650	10,000	40·5	46	
M 1	Gross	1909	5	243	40	2 Körting	150	3,700	23·8	27	
M 2	,,	1909	5	243	40	2 ,,	150	3,700	23·8	27	
M 4	,,	1912	7	272	41	4 ,,	300	5,500	33·5	38	
PL 1	Parseval	1908	3	197	31	1 Daimler	85	2,400	24·8	28	Privately owned.
PL 6	,,	1910	7·5	223	48	2 N.A.G.	220	4,400	28	32	,, ,,
PL 9	,,	1911	1·8	148	29	1 ,,	50	1,300	25·5	29	,, ,,
PL 10	,,	1912	1·8	148	29	2 ,,	100	1,100	27·2	31	,, ,,
PL 12	,,	1912	8	230	48	2 ,,	220	6,600	32·5	37	,, ,,
R 1	Ruttenberg	1910	1·7	150	24	1 F.I.A.T.	75	1,100	21·1	24	
R 2	,,	1912	4	214	36	2 ,,	120	2,300	28	32	
V 1	Veeh	1913	8	246	40	4 Daimler	360	7,000	37	42	
Clouth	..	1909	1·9	138	28	1 Argus	50	1,050	17·6	20	
Suchard	..	1911	11·7	249	54	2 N.A.G.	220	8,800	24·8	28	

Austria-Hungary.

Name.	Make.	Date.	Displacement.	Length.	Diameter.	Motors.	Total H.P.	Useful Load.	Speed, knots.	Speed, m.p.h.	Remarks.
			tons	ft.	ft.			lb.			
						MINE-LAYING AND SCOUTING AIRSHIPS.					
P.L. 4	Parseval ..	1909	2·3	..	..	1 Mercedes ..	100	5730			
Körting	Körting ..	1910	3·6	..	..	2 Körting ..	75				
Astra	Astra	1911	4								
Von Holbein ..	..	1911	7								
Stagl-Mannsbarth	..	1911	8·2	..	..	2-150	300	..	..	..	Privately owned.

Italy.

Name.	Make.	Date.	Displacement.	Length.	Diam.	Motors.	Total H.P.	Useful Load.	Speed, knots.	Speed, m.p.h.	Remarks.
			tons.	ft.	ft.			lb.			
						BATTLE AIRSHIP.					
?	..	1911	16	?	?	?	..	..	..	..	Believed to be a failure.
						MINE-LAYING AND SCOUTING AIRSHIPS.					
P 1	Military ..	1907	4	197	38	1 Clement Bayard	103	3,000	..	33	
P 2	,, ..	1910	4·4	207	38	1 Clement Bayard	120	3,700	..	35	
P 3	,, ..	1910	4·4	207	38	1 Clement Bayard	120	3,700	..	35	
P 4	,, ..	1912	4·7	207	39	2 F.I.A.T. ..	160	4,600	..	38	
P 5	,, ..	1913	4·7	207	39	2 F.I.A.T. ..	160	4,600	..	38	
M 1	,, ..	1912	12	272	56	2 F.I.A.T. ..	500	9,000	..	44	
M 2	,, ..	1913	12	272	56	4 Wolseley ..	500	9,000	..	48	
P 6	Parseval ..	1913	10·3	250	49	3 Maybach ..	510	7,500	35·8	43	

France.

Name.	Make.	Date.	Displacement.	Length.	Diameter.	Motors.	Total H.P.	Useful Load.	Speed, knots.	Speed, m.p.h.	Remarks.
			tons	ft.	ft.			lb.			
BATTLE AIRSHIP.											
Speiss	Speiss	1912	14·3	341	43	2 Chenu.. ..	400	4000?	44·2?	50?	Not yet done trials Owing to small size of doubtful utility.
MINE-LAYING AND SCOUTING AIRSHIPS.											
Lebaudy IV...	Lebaudy ..	1908	3·3	290	34	1 Panhard ..	70	2400	24·6	28	
Liberté	,,	1909	5	235	42	1 Panhard ..	120	3500	28·1	32	
Capt. Maréchal	,,	1911	7·5	278	42	2 Panhard ..	150	5500	26·4	30	
Lt. Selle de Beauchamp .	,,	1911	8	292	48	2 Panhard ..	150	6500	28·1	32	
Col. Renard ..	Astra	1910	4	216	36	1 Panhard ..	100	3000	28·1	32	
Adj. Réau ..	,,	1911	9	285	46	2 Brasier ..	240	6500	30	34	4 machine-guns (?).
Lt. Chauve ..	,, ...	1911	9	285	46	2 Panhard ..	240	6500	30	34	4 machine-guns (?).
Eclaireur Conte	,, ...	1912	6	213	39	2 Chenu.. ..	150	4000	28·1	32	
Adj. Vincenot	Clement-Bayard ..	1911	9	292	42	2 Clement-Bayard ..	200	6500	30	34	
Dupuis de Lôme	,, ..	1912	9	292	42	2 Clement-Bayard ..	200	6500	30	34	
Le Temps . ..	Zodiac	1911	2·5	165	81	1 Laviator ..	70	..	27·2	31	
Capt. Ferber..	,, ...	1911	6	249	40	2 Laviator ..	140	..	30	34	
Com. Coutelle.	,, ...	1912	9	..	..	2 Laviator ..	380	..	..	..	
Fleurus	Military ..	1912	6	252	41	2 Clement-Bayard ..	160	..	31	36	
Ville de Lucerne	Astra	1909	3·4	197	42	1 Clement ..	100	..	23·7	27	
Transaerien ..	,, ...	1912	9	250	47	2 Chenu.. ..	300	..	30·8	35	
Astra-Torres ..	,, ...	1911	1·6	156	27	1 Chenu.. ..	55	..	28·1	32	
Clement-Bayard VI...	Clement-Bayard ..	1913	6·2	..	..	2 Clement-Bayard ..	200	..	33·4	38	
Zodiac III. ..	Zodiac	1909	1·6	130	27	1 Ballot.. ..	40	..	24·6	28	
Building:—											
One Astra ..	..	..	..	..	..	..	..	..	..	45	From 24 to 34 tons displacement. Engines from 800 to 1000 H.P. 4 guns below, 1 on the top over fore car.
One Clement-Bayard ..	..	..	..	..	..	..	..	..	..	45	
One Zodiac..	..	..	..	..	..	..	..	..	..	45	
One Lebaudy		..	..	.	..	..	..	..	..	45	
1 ordered in March 7 over 20 tons ordered	..	1913.								45	

Russia.

Name.	Make.	Date.	Displacement.	Length.	Diam.	Motors.	Total H.P.	Useful Load.	Speed, knots.	Speed, m.p.h.	Remarks.
			tons	ft.	ft.			lb.			
MINE-LAYING AND SCOUTING AIRSHIPS.											
Astra II... ..	Astra	..	6·5								
Zodiac IX. ..	Zodiac	..	2								
Lebed	Lebaudy ..	..	3·7								
Kommissionny	C. Bayard ..	..	3·5								
Parseval	Parseval ..	..	6·7								
Outchebrey ..	..	..	5·5								
Astra	Astra	1913	10	285	49	2 Chenu.. ..	400	..	..	..	4 Hotchkiss.
Clement	Clement ..	1913	10	285	49	..	..	..	..	..	4 Hotchkiss.
Clement	Clement ..	1913	10	285	49	..	..	..	..	..	4 Hotchkiss.
Zodiac	Zodiac	1913	10	285	49	..	..	..	..	..	4 Hotchkiss.
Zodiac	Zodiac	1913	10	285	49	..	..	..	..	..	4 Hotchkiss.
Parseval	Parseval ..	1913	10	280	49	2 Maybach ..	340	..	..	..	2 Hotchkiss.

PLANS

OF

BRITISH AND FOREIGN SHIPS.

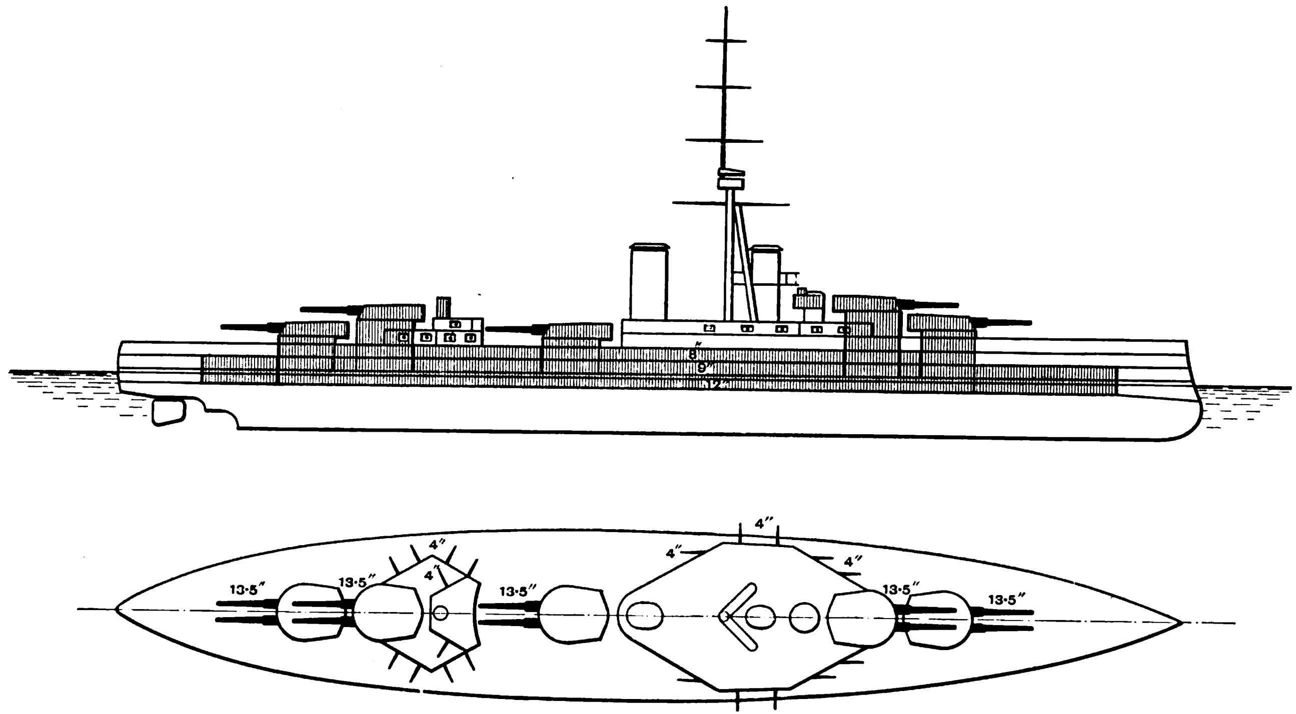
SCALE FOR PLATES.
100 FEET TO THE INCH

b

GREAT BRITAIN.

BATTLESHIPS.

Orion. Conqueror. Monarch. Thunderer. Ajax. Audacious. Centurion. King George V.



Orion . . . . Conqueror . . Monarch . . . Thunderer . .	Length, 545 ft. ; 22,500 tons ; Speed, 21 knots ; Building ; Armament, 10—13·5 in., 16—4 in. ; Completed, 1911-12.
Ajax . . . . Audacious . . Centurion . . King George V.	Length, 555 ft. ; 23,000 tons ; Speed, 21 knots ; Building ; Armament, 10—13·5 in., 16—4 in. ; Building.

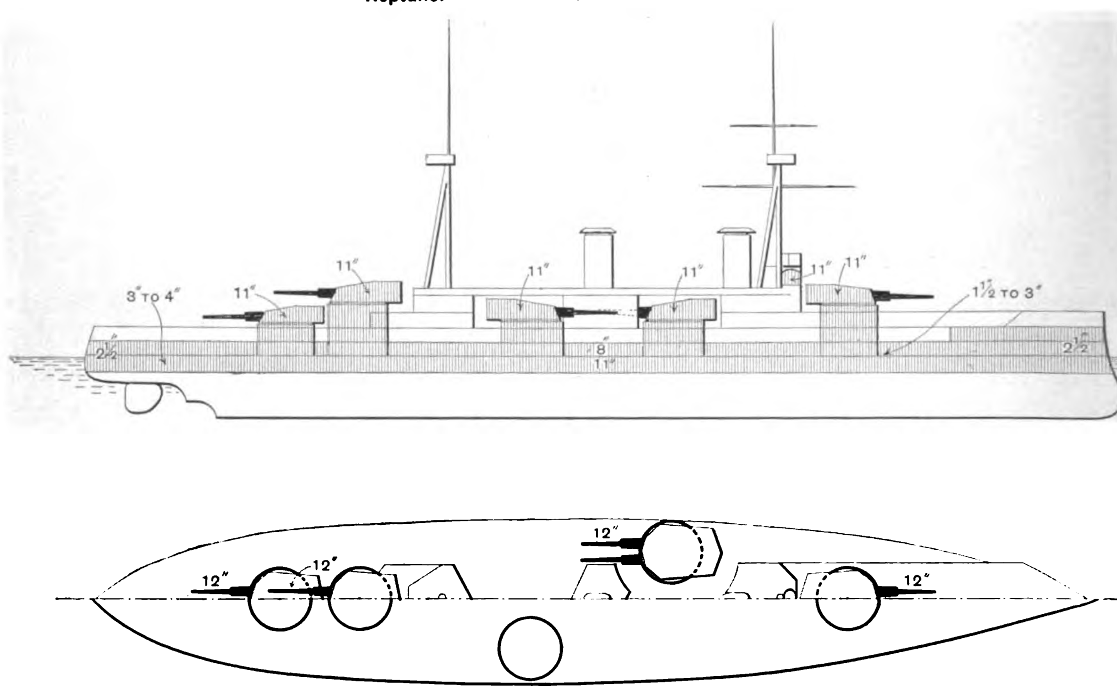
See page 219.

PLATE 1.

GREAT BRITAIN.

BATTLESHIPS.

Neptune. Hercules. Colossus.



Length, 510 ft.; 19,900-20,000 tons; Speed, 21·5-21·78 knots; Completed, 1911; Armament, 10—12 in., 16—4 in.

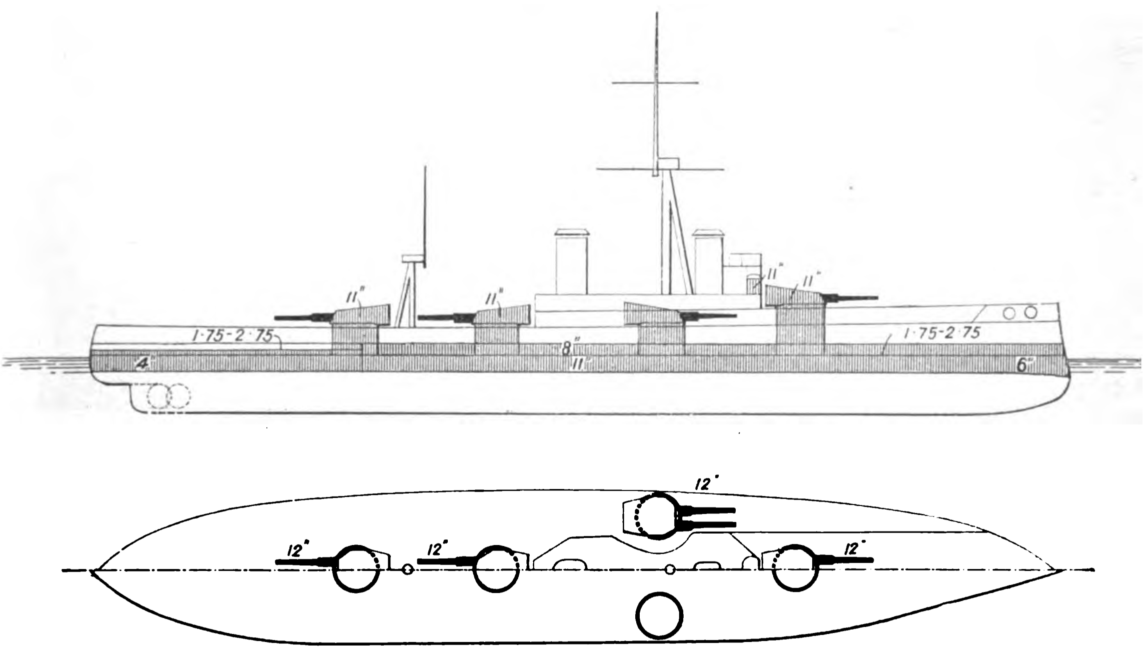
See page 219.

PLATE 2.

GREAT BRITAIN.

BATTLESHIPS.

Dreadnought. **Bellerophon.** **St. Vincent.** **Temeraire.** **Vanguard.** **Superb.** **Collingwood.**



Dreadnought.—Length, 490 ft.; 17,900 tons; Speed, 21·8 knots; Completed, 1906; Armament, 10—12 in., 24—12 pr.

Bellerophon
Temeraire
Superb }—Length, 490 ft.; 18,600 tons; Speed, 21·6–22 knots; Completed, 1909; Armament, 10—12 in., 16—4 in.

Collingwood
St. Vincent
Vanguard }—Length, 500 ft.; 19,250 tons; Speed, 21·5–22·1 knots; Completed, 1910; Armament, 10—12 in., 20—4 in.

N.B.—The masts are differently arranged in the later ships.

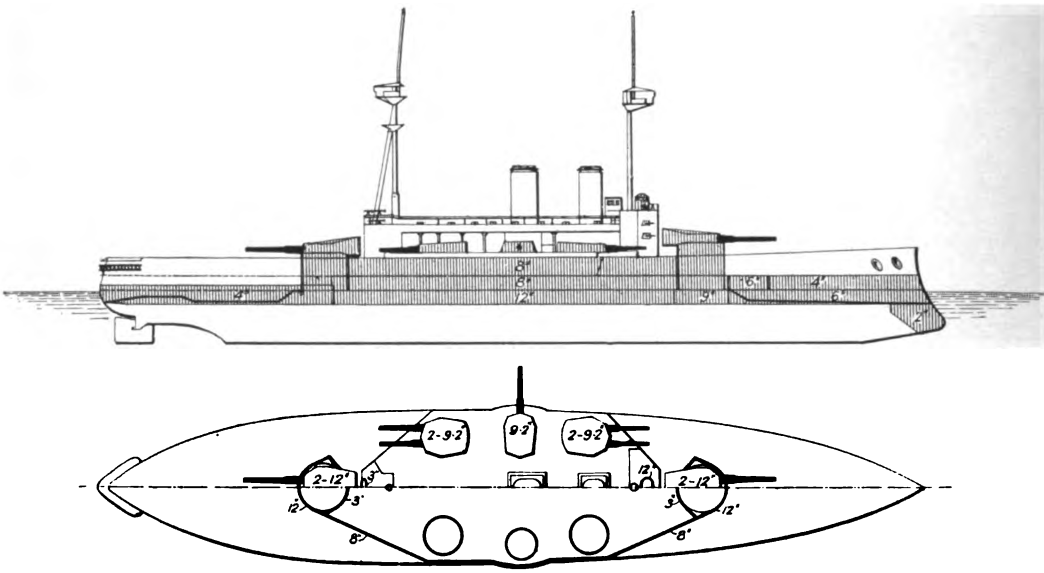
See page 216.

PLATE 3.

GREAT BRITAIN.

BATTLESHIPS.

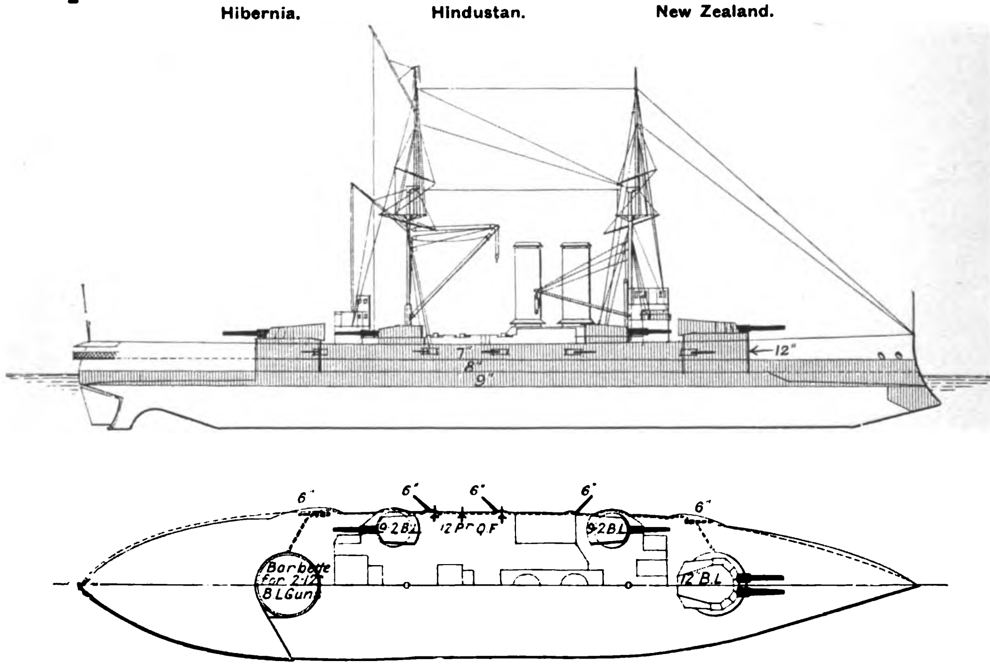
Lord Nelson. **Agamemnon.**



Length, 410 ft.; 16,500 tons; Speed, 18·75–18·9 knots; Completed, 1908; Armament, 4—12 in., 10—9·2 in., 24—12 pr., 5 small.

See page 219.

King Edward VII. **Africa.** **Hibernia.** **Britannia.** **Hindustan.** **Commonwealth.** **New Zealand.** **Dominion.**



Length, 425 ft.; 16,350 tons; Speed, 18·5—19·5 knots; Completed, 1905–1906; Armament, 4—12 in., 4—9·2 in., 10—6 in., 14—12 pr., 17 small.

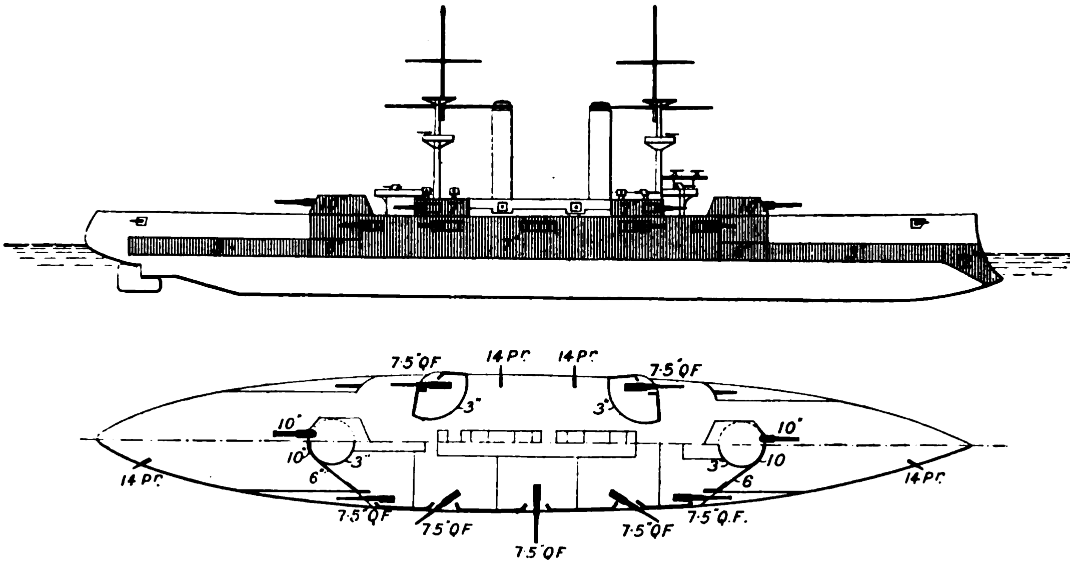
See page 218.

Plate 4.

GREAT BRITAIN.

BATTLESHIPS.

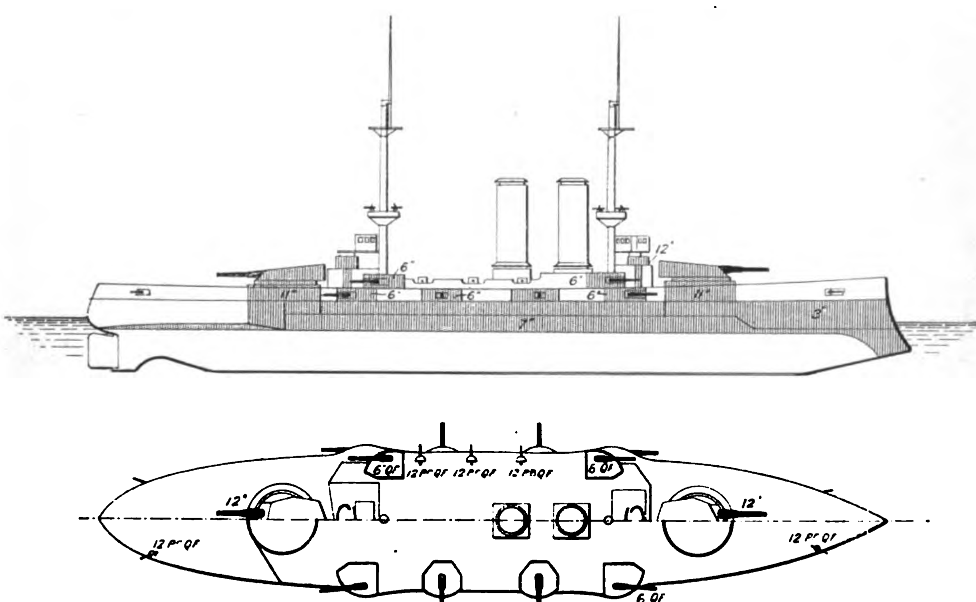
Triumph. **Swiftsure.**



Length, 436 ft.; 11,800 tons; Speed, 19·6 knots; Completed, 1904;
Armament, 4—10 in., 14—7·5 in., 14—14 pr., 2—12 pr., 8 small.

See page 221.

Duncan. **Albemarle.** **Cornwallis.** **Exmouth.** **Russell.**



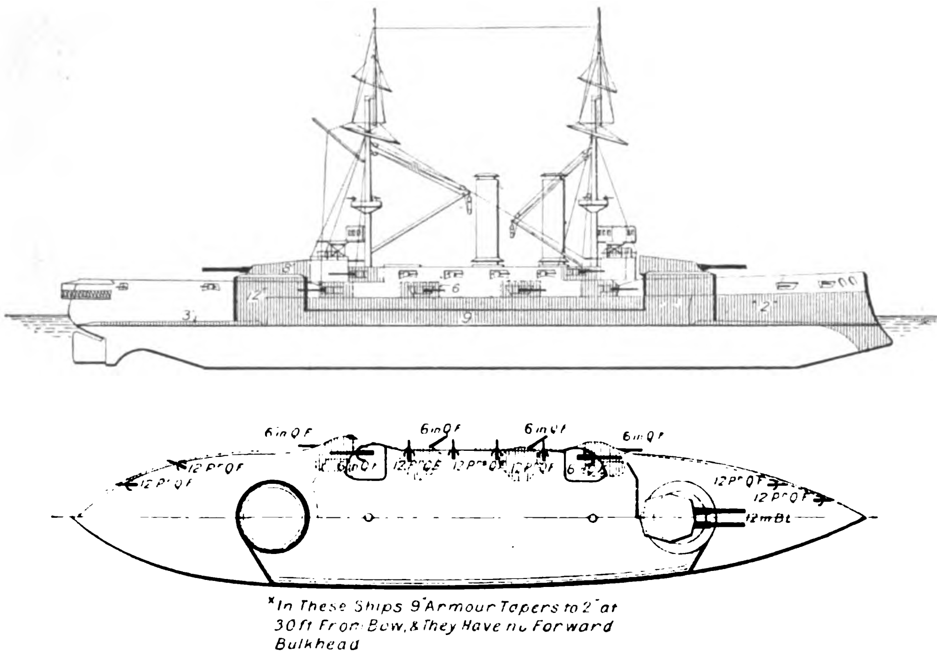
Length, 405 ft.; 14,000 tons; Speed, 18·6—19·3 knots; Completed, 1903–1904;
Armament, 4—12 in., 12—6 in., 12—12 pr., 8 small.

See page 217.

GREAT BRITAIN.

BATTLESHIPS.

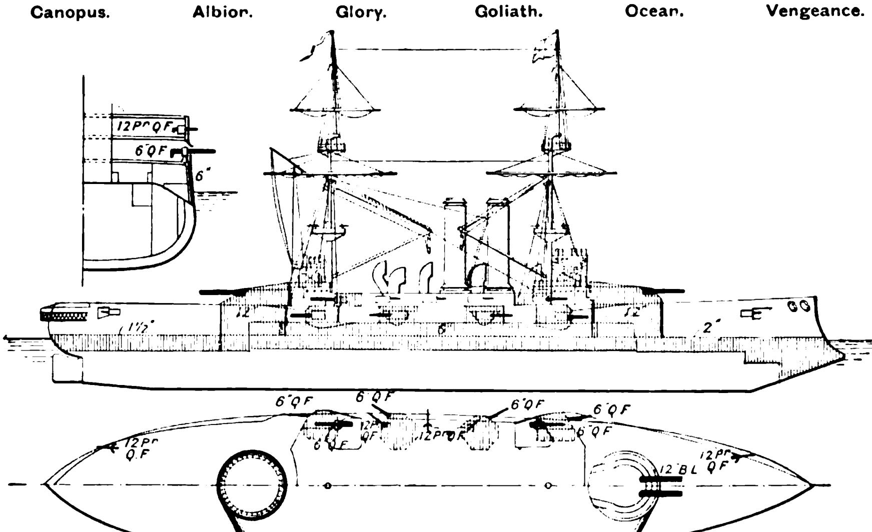
*Formidable. *Bulwark. Implacable. Irresistible. *London.
*Prince of Wales. *Queen. *Venerable.



Length, 400 ft. ; 15,000 tons ; Speed, 18—18·3 knots ; Completed, 1901-1904 ;
Armament, 4—12 in., 12 6 in., 18—12 pr., 8 small.

See page 217.

Canopus. Albion. Glory. Goliath. Ocean. Vengeance.



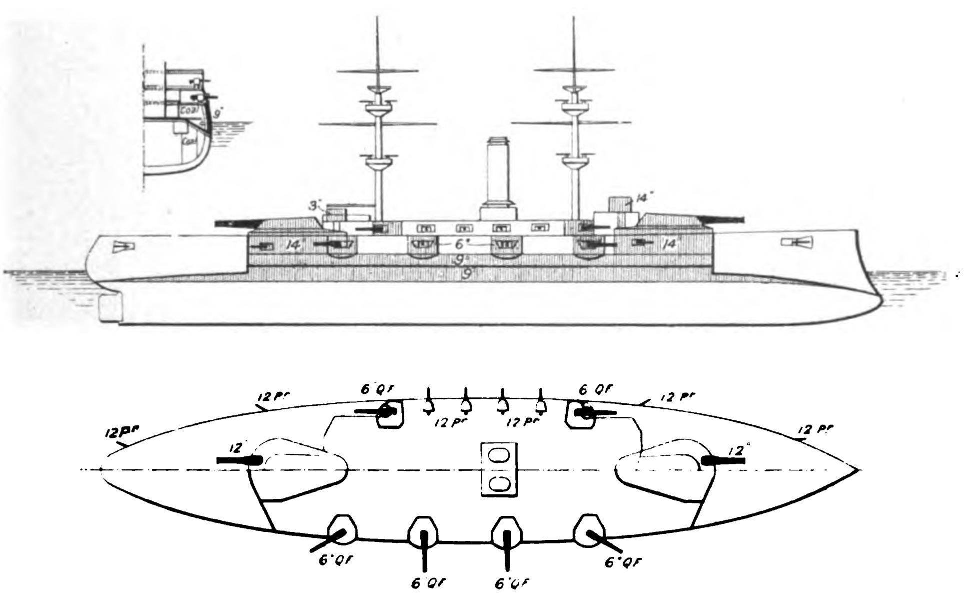
Length, 390 ft. ; 12,950 tons ; Speed, 18·2—18·5 knots ; Completed, 1900-1902 ;
Armament, 4—12 in., 12—6 in., 12—12 pr., 8 small.

See page 215.

GREAT BRITAIN.

BATTLESHIPS.

Majestic. **Cæsar.** **Hannibal.** **Illustrious.** **Jupiter.** **Magnificent.**
Mars. **Prince George.** **Victorious.**



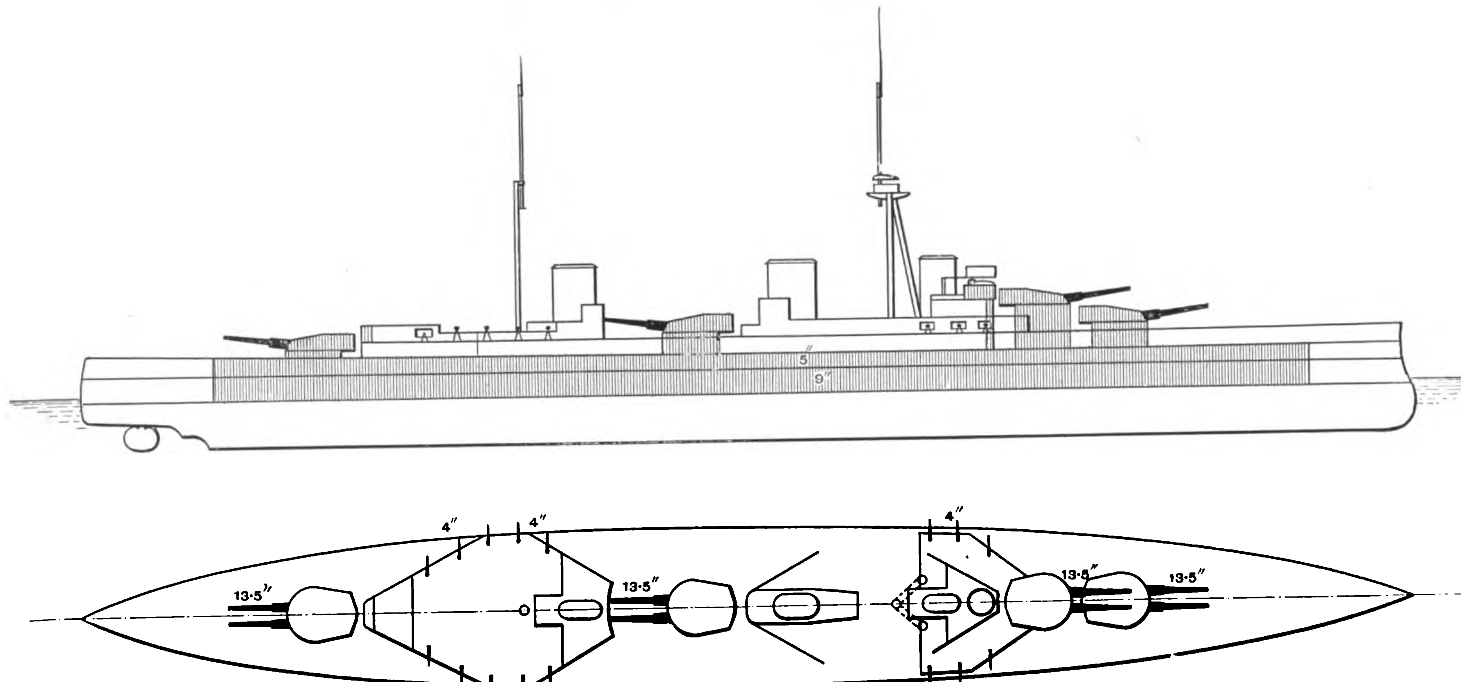
Length, 390 ft. ; 14,900 tons ; Speed, 17·5 knots ; Completed, 1895-1898 ;
Armament, 4—12 in., 12—6 in., 18—12 pr., 10 small.

See page 219.

GREAT BRITAIN.

ARMOURED CRUISERS.

Lion. **Princess Royal.** **Queen Mary.**



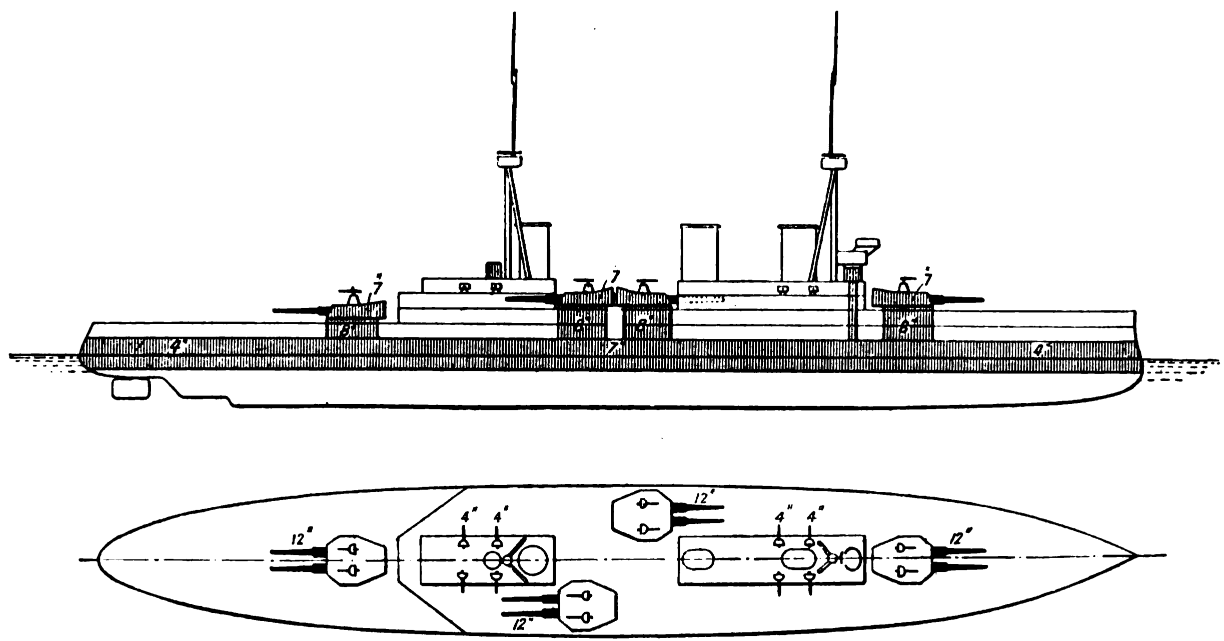
Length, 660 ft.; 26,350–27,000 tons; Speed, 28 knots; Completed, 1912, and Building; Armament, 8—13·5 in., 16—4 in.

See page 219.

GREAT BRITAIN.

ARMOURED CRUISERS.

Invincible. **Indomitable.** **Inflexible.** **Indefatigable.***



Invincible, **Indomitable**, **Inflexible**: Length, 530 ft.; 17,250 tons; Speed, 26 knots; Completed, 1908-9; Armament, 8—12 in., 16—4 in.

* **Indefatigable**: Length, 555 ft.; 18,750 tons; Speed, 25 knots; Completed, 1911; Armament, 8—12 in., 16—4 in.

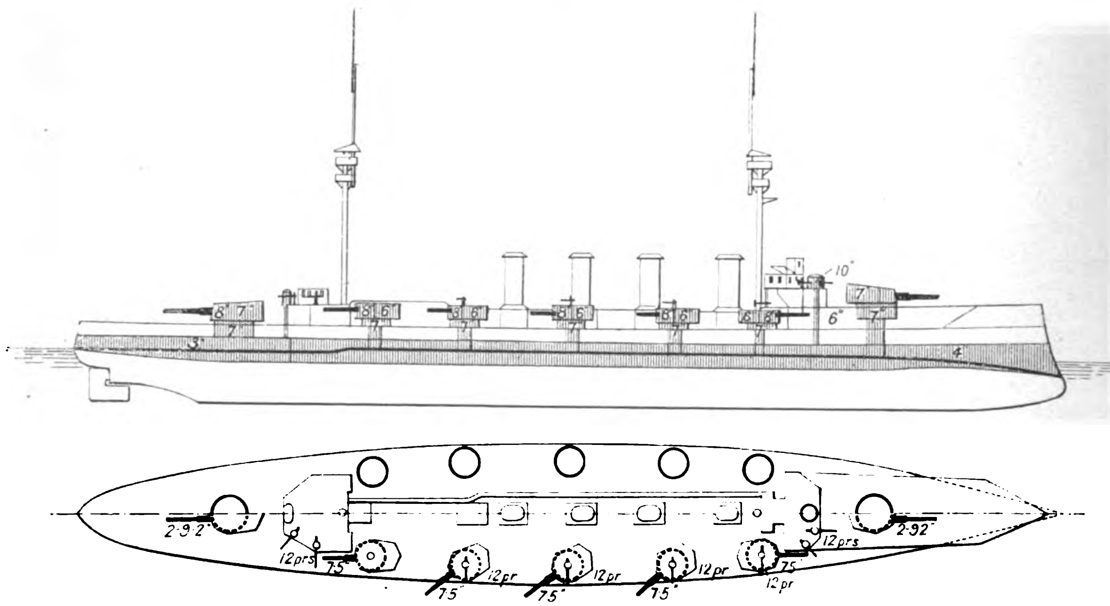
* The centre turrets are more *en échelon* than in the three earlier ships.

See page 218.

GREAT BRITAIN.

ARMOURED CRUISERS.

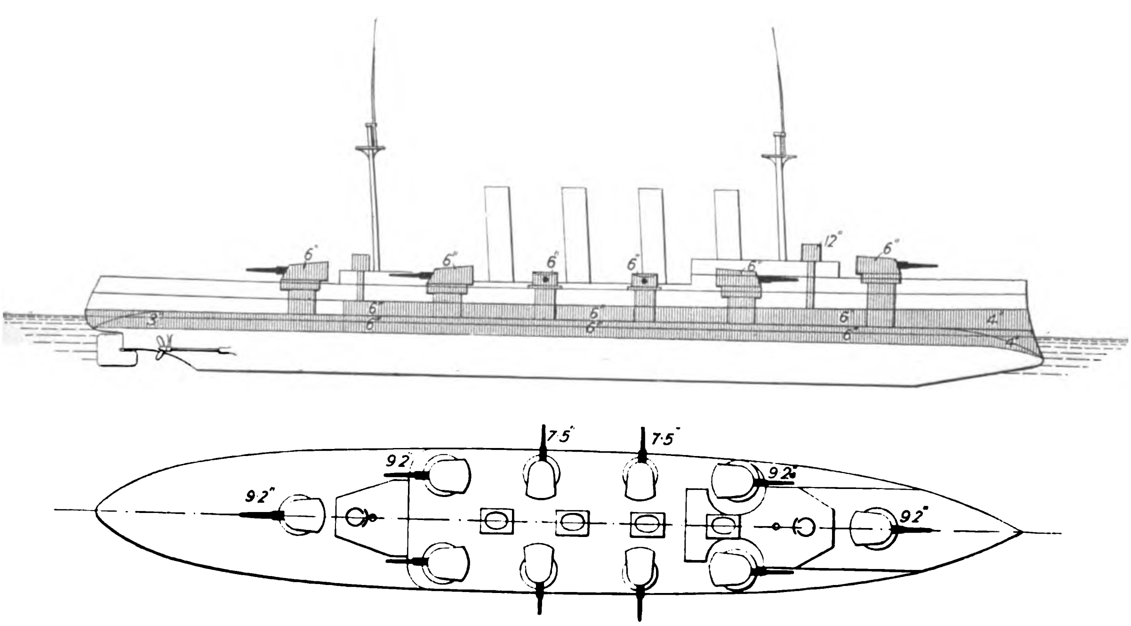
Defence. **Minotaur.** **Shannon.**



Length, 490 ft.; 14,600 tons; Speed, 22·5–23·5 knots; Completed, 1907–1908;
Armament, 4—9·2 in., 10—7·5 in., 16—12 pr., 5 small.

See page 216.

Achilles. **Cochrane.** **Natal.** **Warrior.**



Length, 480 ft.; 13,550 tons; Speed, 22·3–23·3 knots; Completed, 1906–1907;
Armament, 6—9·2 in., 4—7·5 in., 1—12 pr., 31 small.

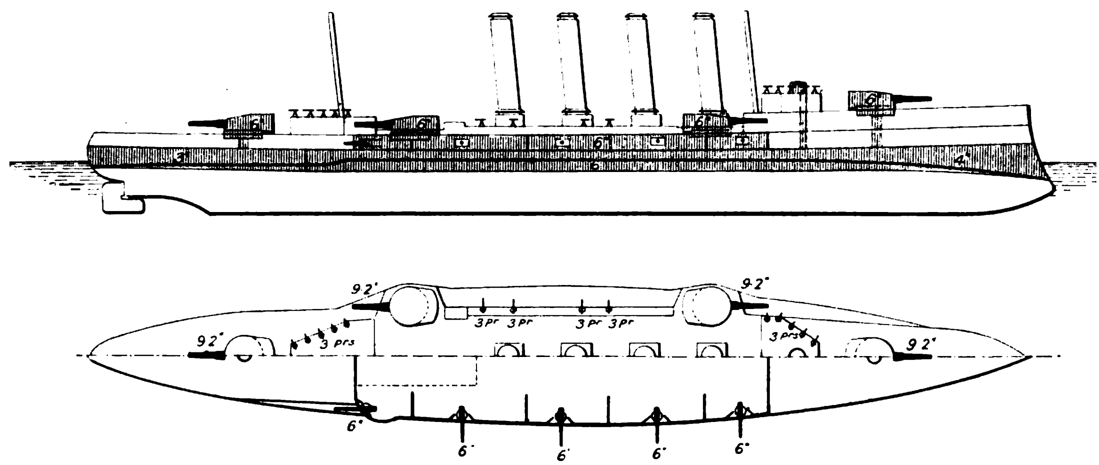
See page 214.

Plate 10.

GREAT BRITAIN.

ARMOURED CRUISERS.

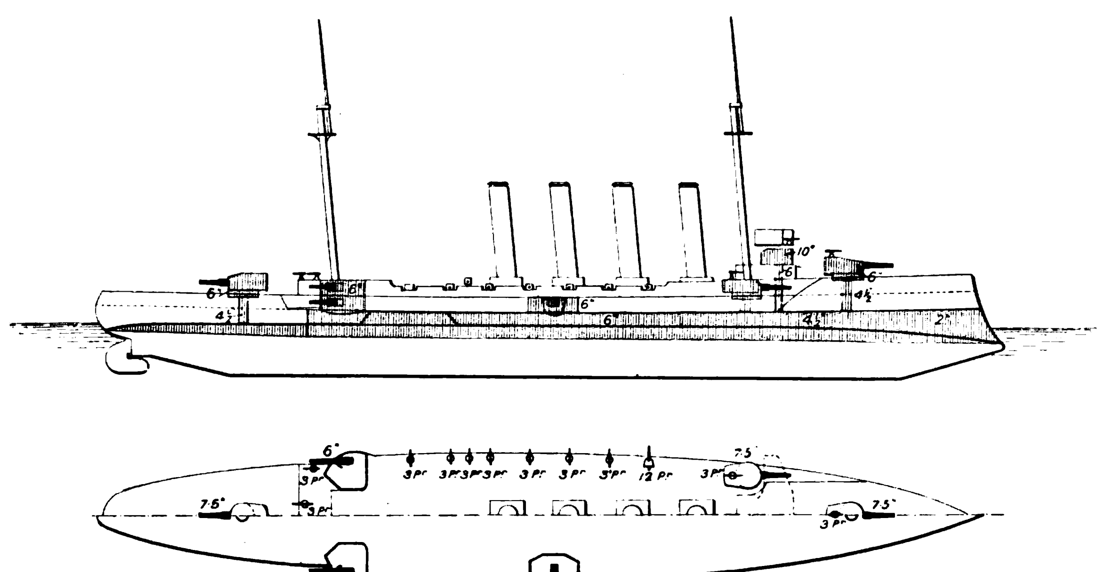
Black Prince. Duke of Edinburgh.



Length, 480 ft.; 13,550 tons; Speed, 22·8–23·6 knots; Completed, 1906;
Armament, 6—9·2 in., 10—6 in., 2—12 pr., 27 small.

See page 215.

Devonshire. Antrim. Argyll. Carnarvon. Hampshire. Roxburgh.



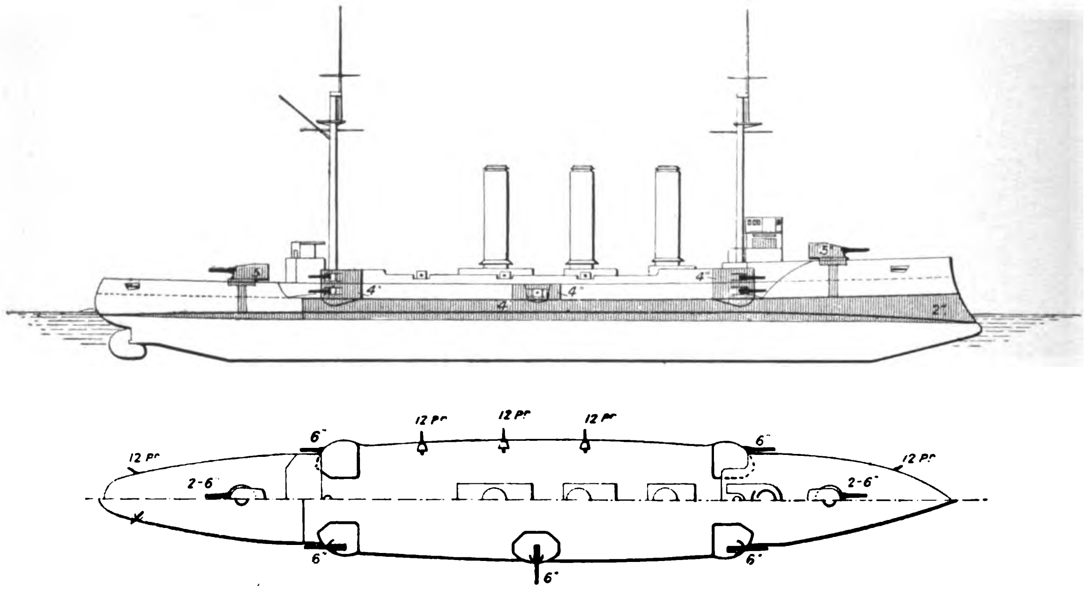
Length, 450 ft.; 10,850 tons; Speed, 22·2–23·6 knots; Completed, 1905–1906;
Armament, 4—7·5 in., 6—6 in., 1—12 pr., 24 small.

See page 216.

GREAT BRITAIN.

ARMOURED CRUISERS.

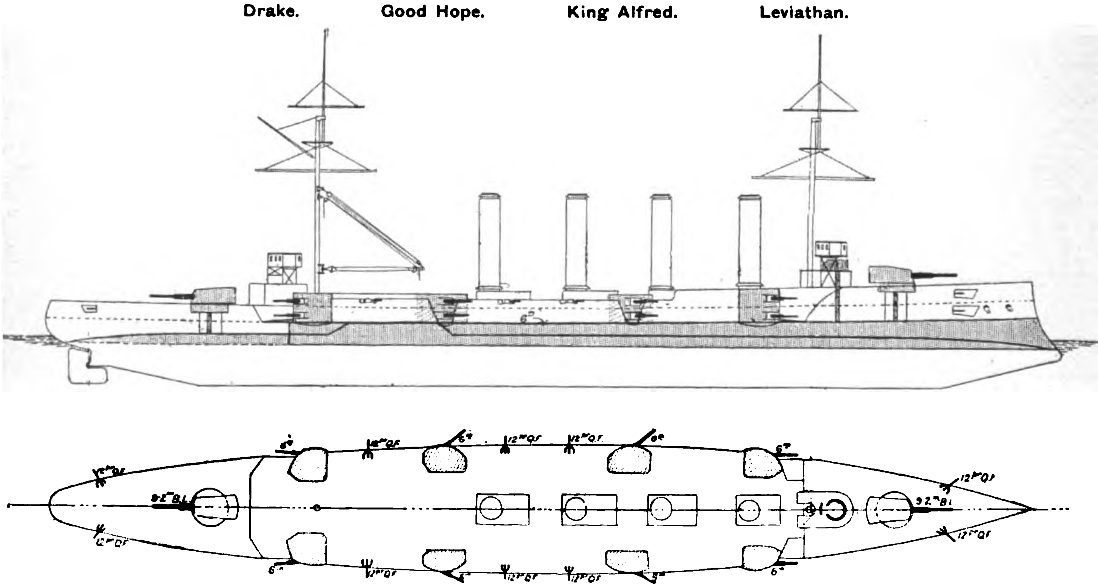
Berwick. Cornwall. Cumberland. Donegal. Essex. Kent. Lancaster. Monmouth. Suffolk.



Length, 440 ft. ; 9,800 tons ; Speed, 22·7–24·7 knots ; Completed, 1903–1905 ;
Armament, 14—6 in., 10—12 pr., 9 small.

See page 215.

Drake. Good Hope. King Alfred. Leviathan.



Length, 500 ft. ; 14,100 tons ; Speed, 23·3–24·1 knots, ; Completed, 1902–1903 ;
Armament, 2—9·2 in., 16—6 in., 12—12 pr., 7 small.

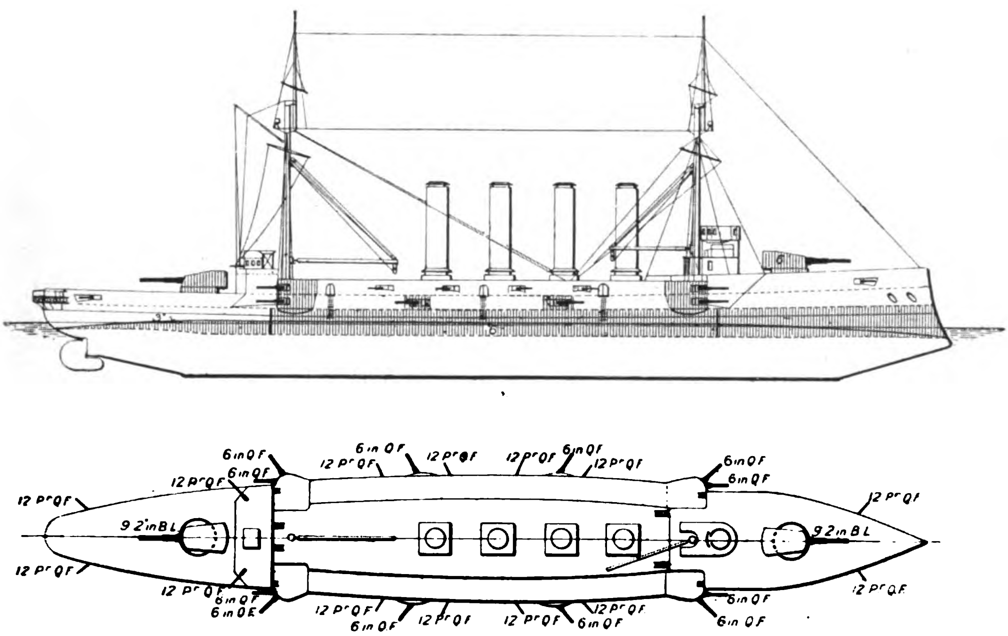
See page 216.

PLATE 12.

GREAT BRITAIN.

ARMOURED CRUISERS.

Cressy. Aboukir. Bacchante. Euryalus. Hogue. Sutlej.



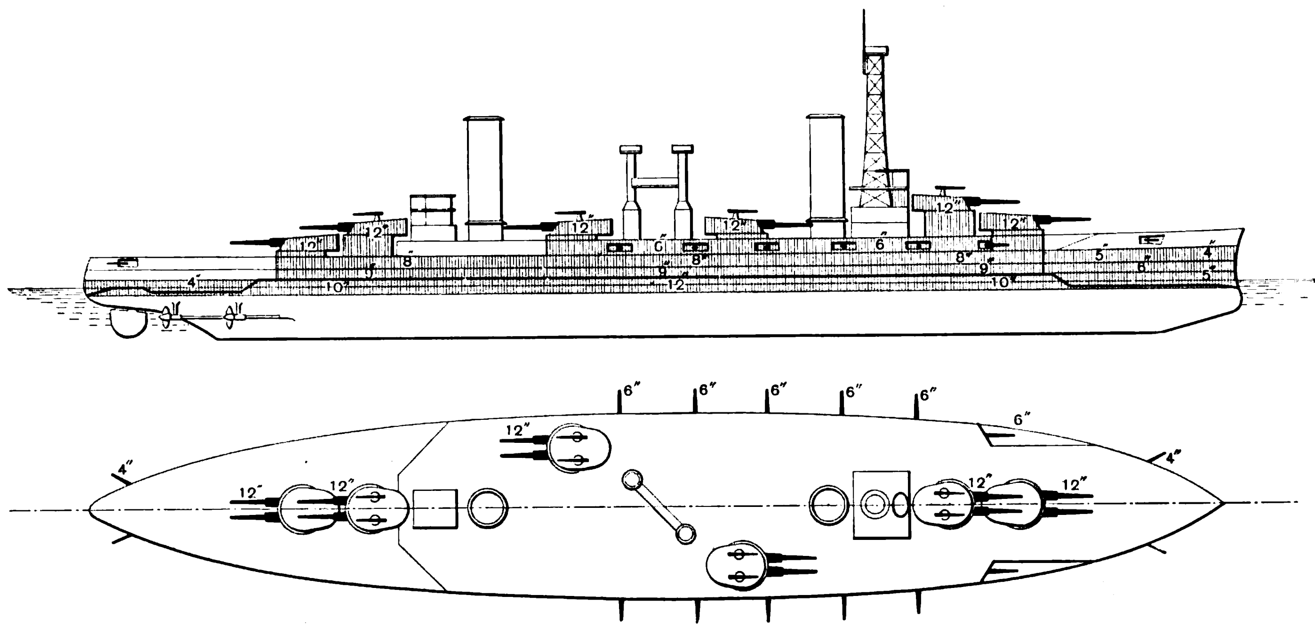
Length, 440 ft.; 12,000 tons; Speed, 20·8—21·8 knots; Completed, 1901-1904;
Armament, 2—9·2 in., 12—6 in., 14—12 pr., 15 small.

See page 216.

ARGENTINE.

BATTLESHIPS.

Moreno. Rivadavia.



Length, 578 ft.; 28,000 tons; Speed, 22·5 knots; Building;
Armament, 12—12 in., 12—6 in., 12—4 in.

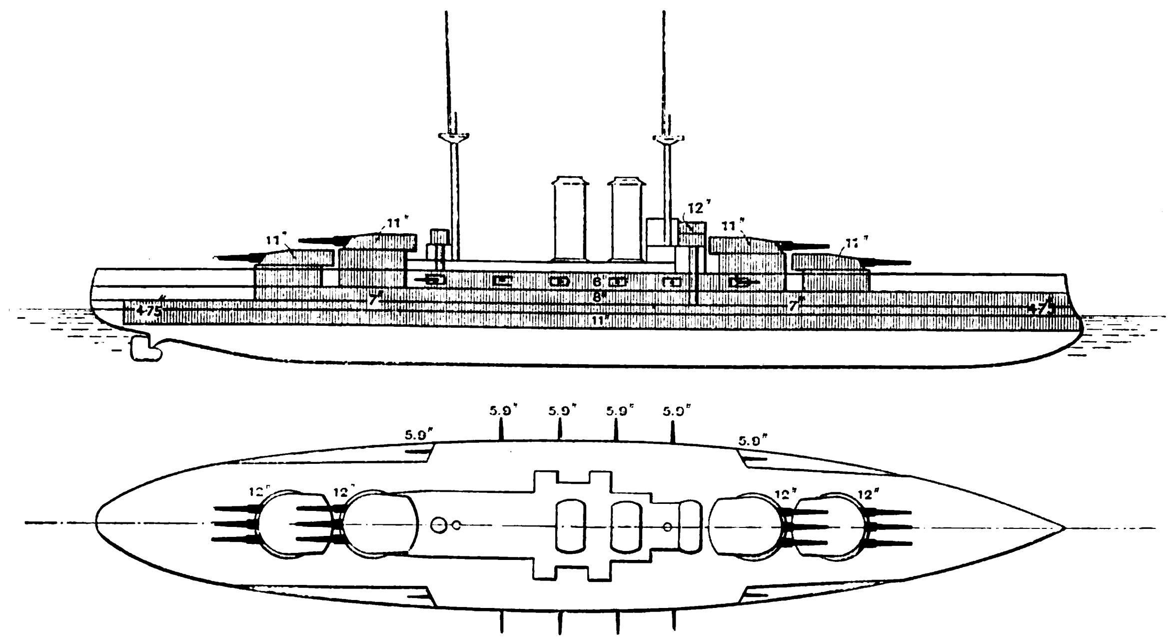
See page 230.

PLATE 14.

AUSTRIA.

BATTLESHIPS.

Prinz Eugen. Tegetthoff. Viribus Unitis. "No. VII."



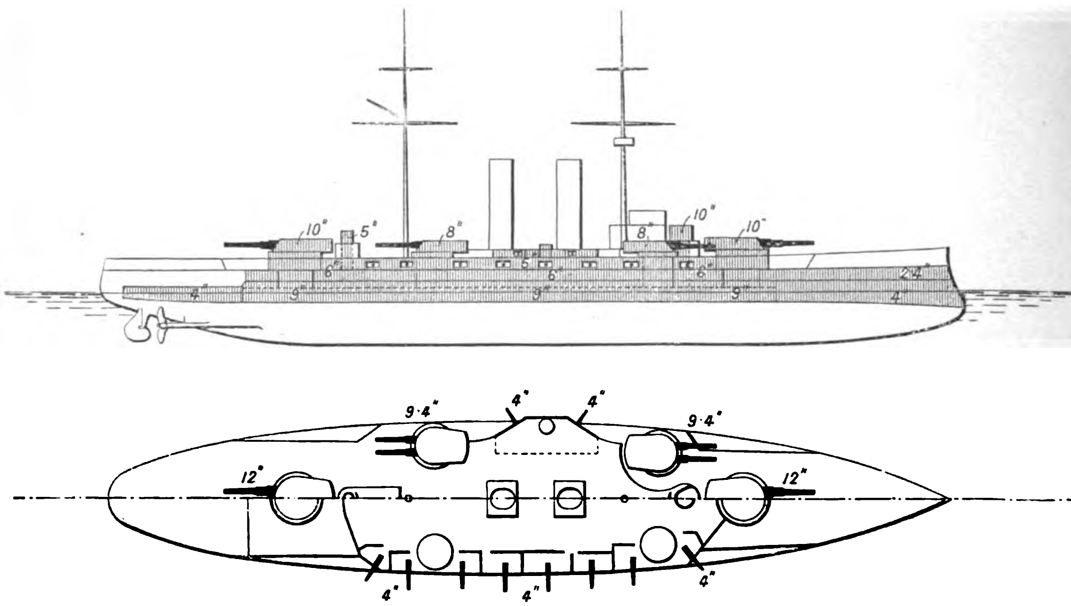
Length, 495 ft.; 20,000 tons; Speed, 20·7 knots; Completed 1913 and Building;
Armament, 12—12 in., 12—5·9 in., 18—12 pr.

See page 232.

AUSTRIA.

BATTLESHIPS.

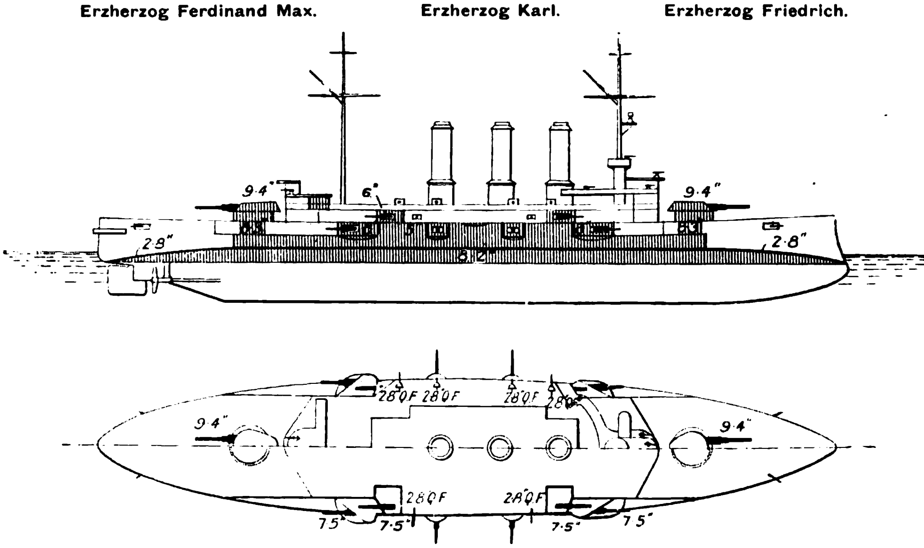
Erzherzog Franz Ferdinand. **Radetzky.** **Zrinyi.**



Length, 451 ft. ; 14,226 tons ; Speed, 20·5 knots ; Completed, 1910-1911 ;
Armament, 4—12 in., 8—9·4 in., 20—4 in., 6—12 pr., 2 small.

See page 232.

Erzherzog Ferdinand Max. **Erzherzog Karl.** **Erzherzog Friedrich.**



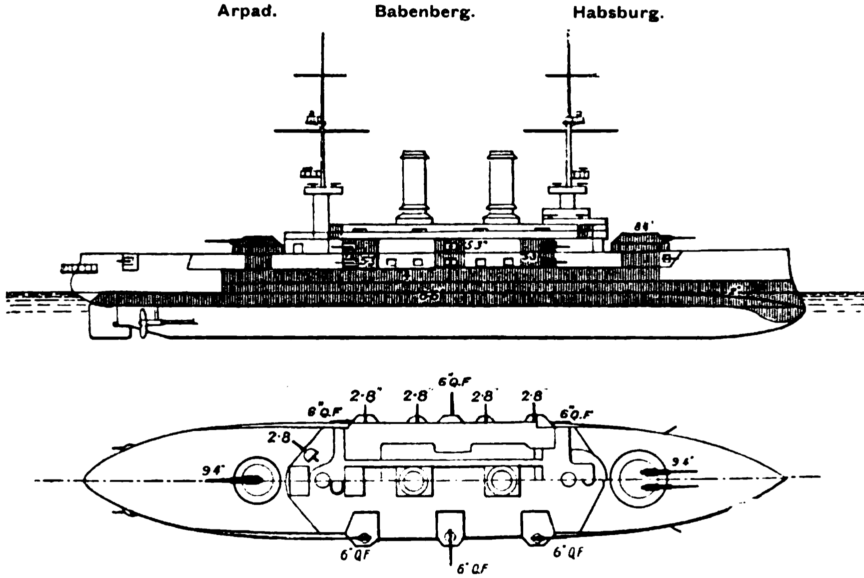
Length, 390 ft. ; 10,433 tons ; Speed, 20—20·6 knots ; Completed, 1906-1907 ;
Armament, 4—9·4 in., 12—7·5 in., 12—12 pr., 16 small.

See page 232.

AUSTRIA.

BATTLESHIPS.

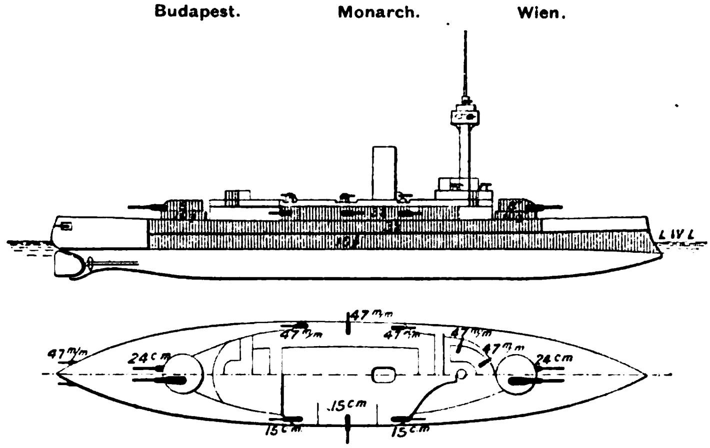
Arpad. Babenberg. Habsburg.



Length, 354 ft. ; 8208 tons ; Speed, 19·6 knots ; Completed, 1902-1904 ; Armament, 3—9·4 in., 12—6 in., 10—12 pr., 10 small.

See page 232.

Budapest. Monarch. Wien.



Length, 305 ft. ; 5462-5550 tons ; Speed, 17·5 knots ; Completed, 1897-1898 ; Armament, 4—9·4 in., 6—5·9 in., 20 small.

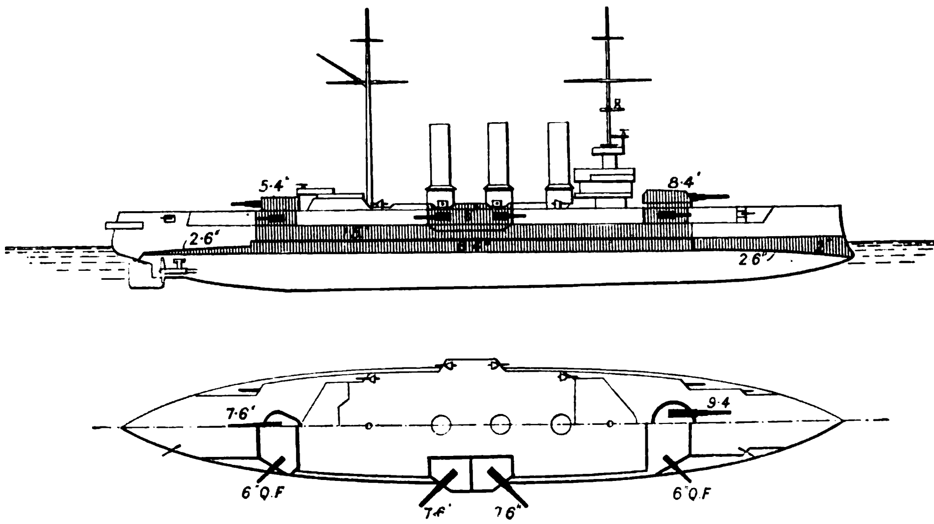
See page 232.

PLATE 17.

c 2

ARMOURED CRUISERS.

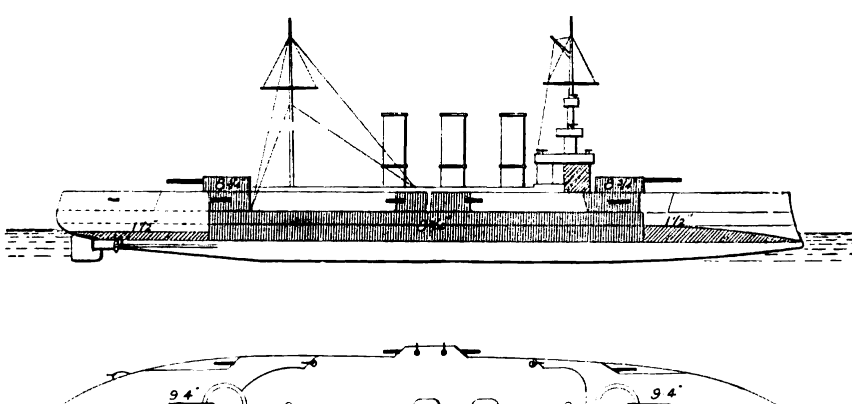
St. Georg.



Length, 384 ft.; 7185 tons; Speed, 22 knots; Completed, 1906; Armament, 2—9·4 in., 5—7·6 in., 4—6 in., 9—12 pr., 16 small.

See page 232.

Kaiser Karl VI.



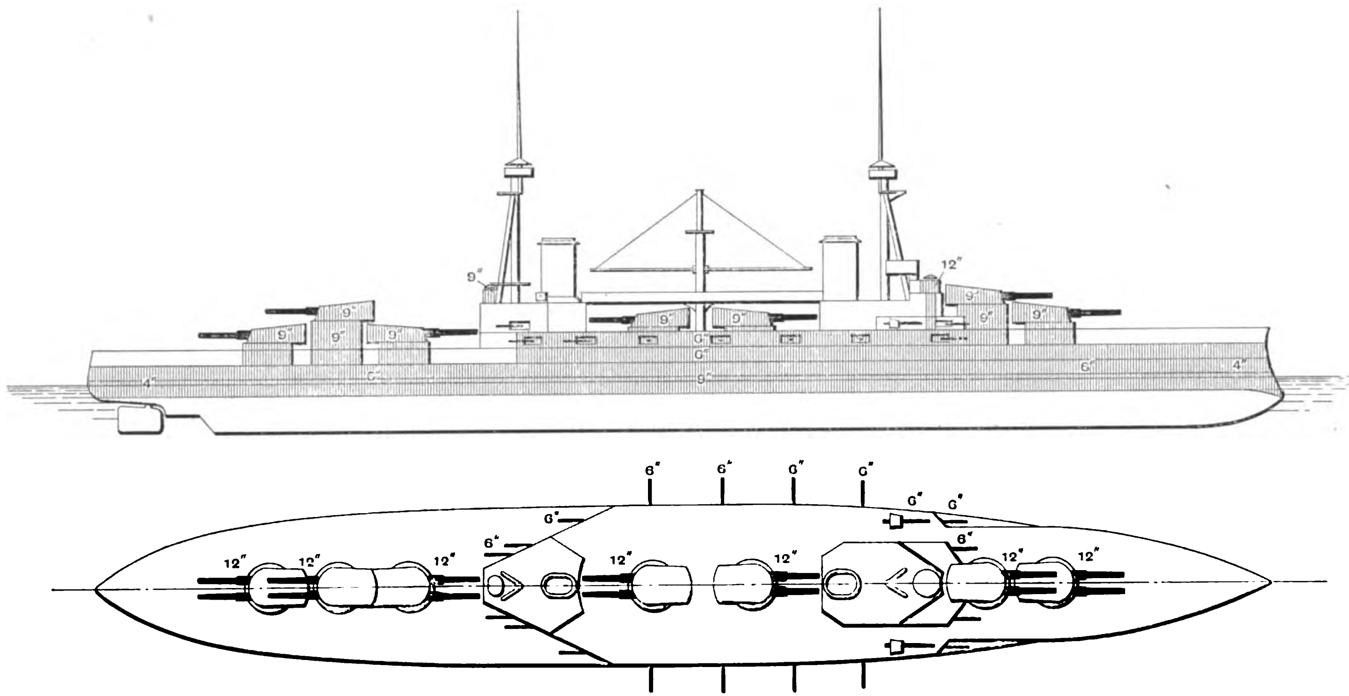
Length, 367 ft.; 6151 tons; Speed, 20·7 knots; Completed, 1900; Armament, 2—9·4 in., 8—5·9 in., 22 small.

See page 232.

BRAZIL.

BATTLESHIP.

Rio de Janeiro.



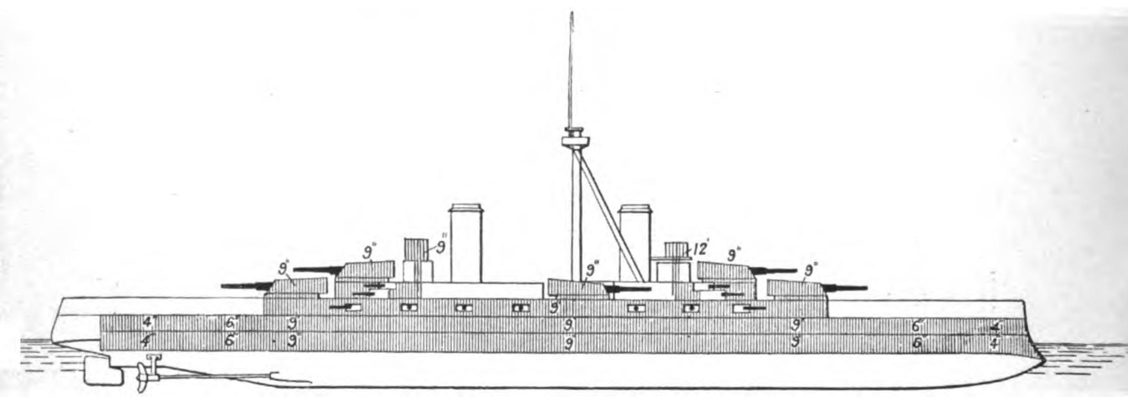
Length, 637 ft.; 27,500 tons; Speed, 22 knots;
Armament, 14–12 in.; 20–6 in. 10–3 pr.

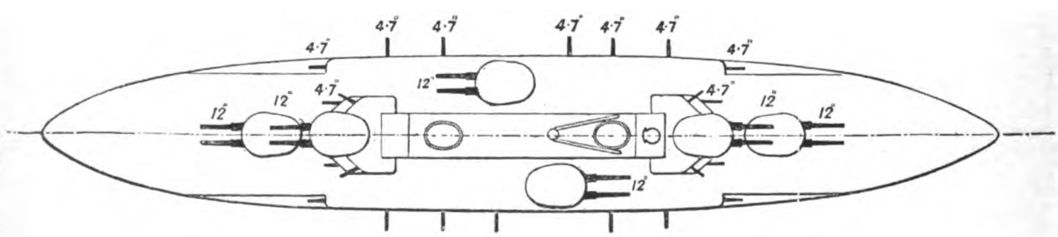
See page 234.

BRAZIL.

BATTLESHIPS.

Minas Geraes. **Sao Paulo.**





Length, 500 ft. ; 19,281 tons ; Speed, 21 knots ; Completed, 1909, 1910.
Armament, 12—12 in., 22—4·7 in., 8 small.

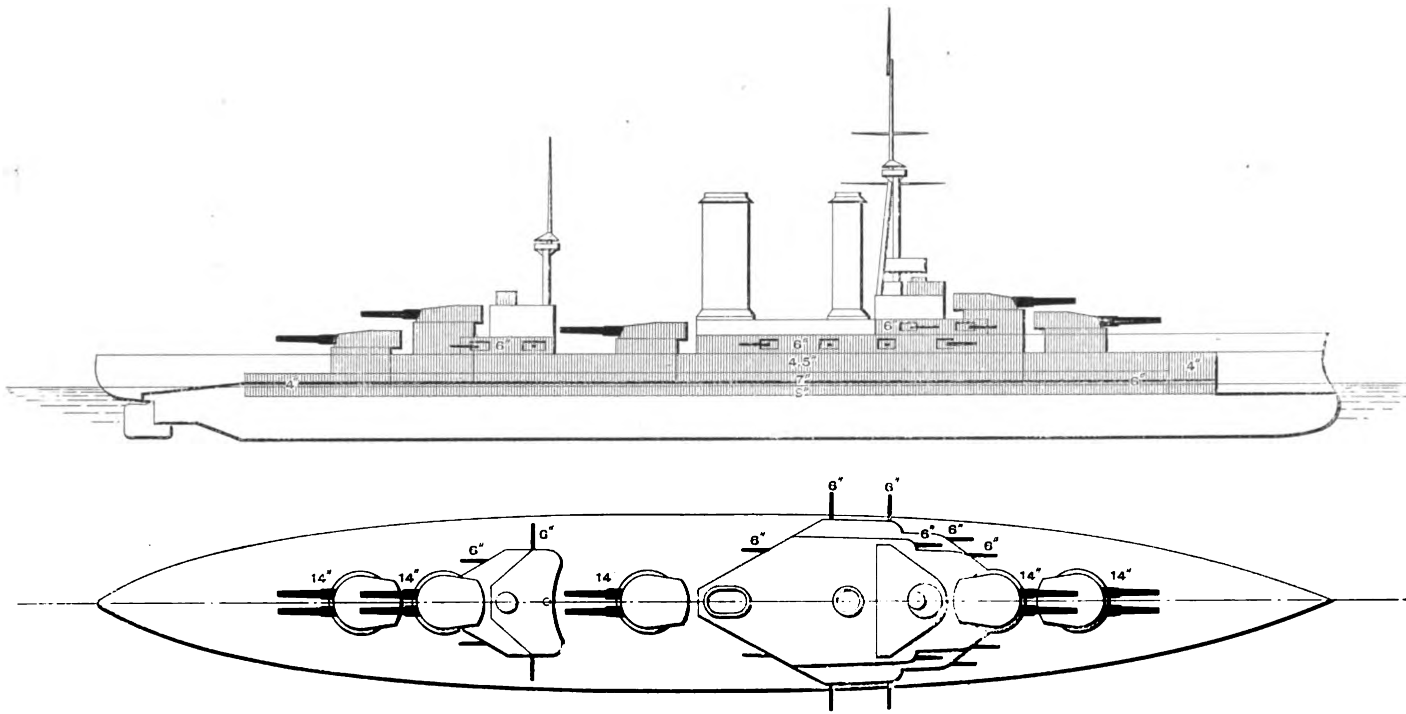
See page 234.

PLATE 20.

CHILE.

BATTLESHIPS.

Almirante Cochrane. **Almirante Latorre.**



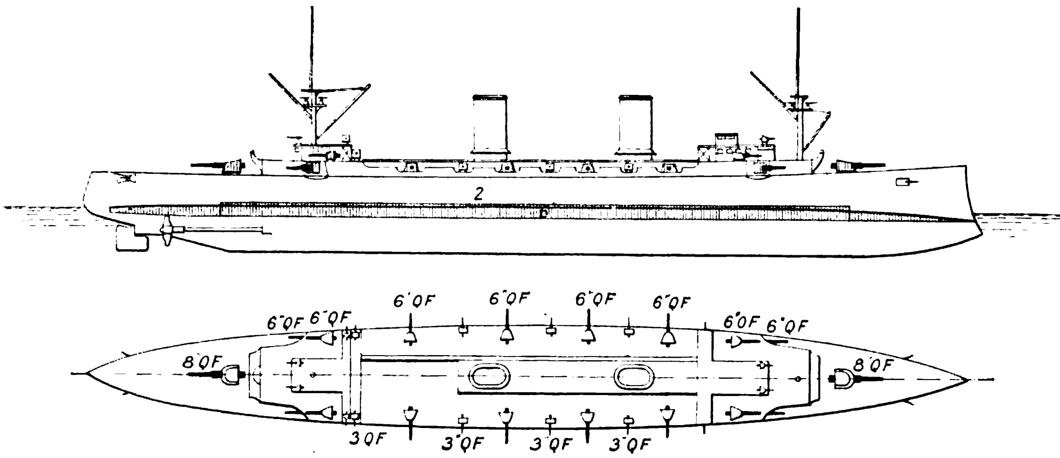
Length, 625 ft. ; 2,800 tons ; Speed, 23 knots ; Building ;
Armament, 10—14 in. ; 16—6 in. ; 4—3 in. and smaller.

See page 236.

CHILE.

ARMOURED CRUISER.

Esmeralda.



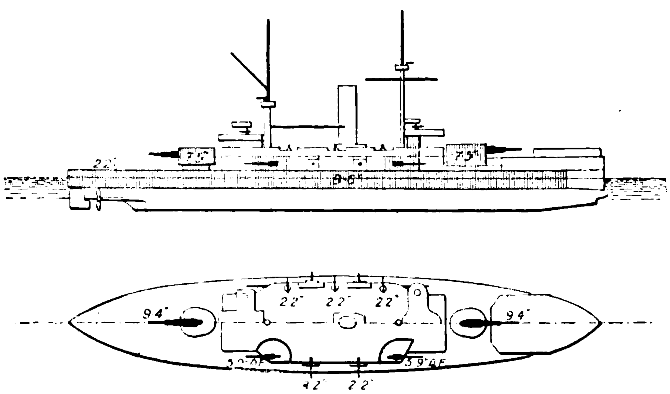
**Length, 436 ft. ; 7020 tons ; Speed, 22·8 knots ; Completed, 1897 ;
Armament, 2—8 in., 16—6 in., 8—12 pr., 6 small.**

See page 236.

DENMARK.

COAST DEFENCE SHIPS.

Herluf Trolle. **Olfert Fischer.** **Peder Skram.**



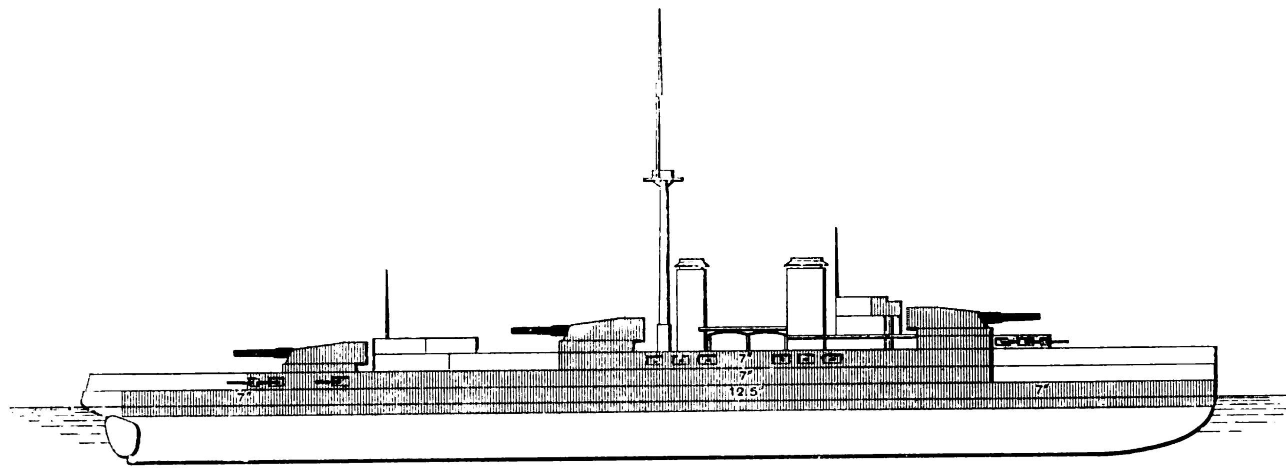
Length, 271-274 ft. ; 3415-3543 tons ; Speed, 16-16·5 knots ; Completed, 1901-1910 ;
Armament, 2—9·4 in., 4—5·9 in., 18 small.

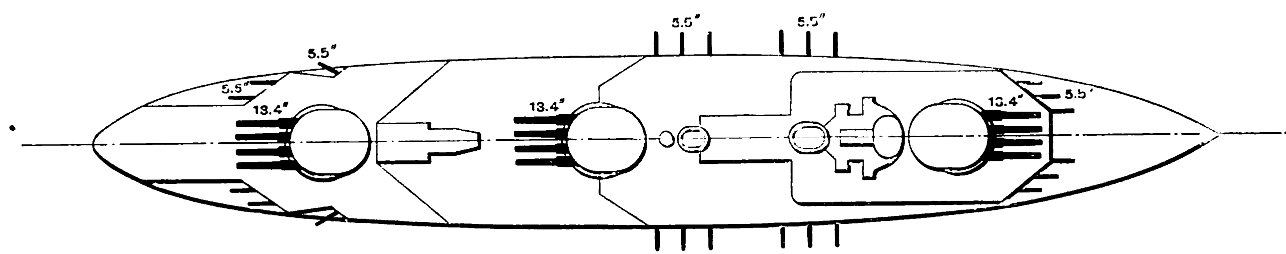
See page 238.

FRANCE.

BATTLESHIPS.

Flandre. Gascogne. Languedoc. Normandie





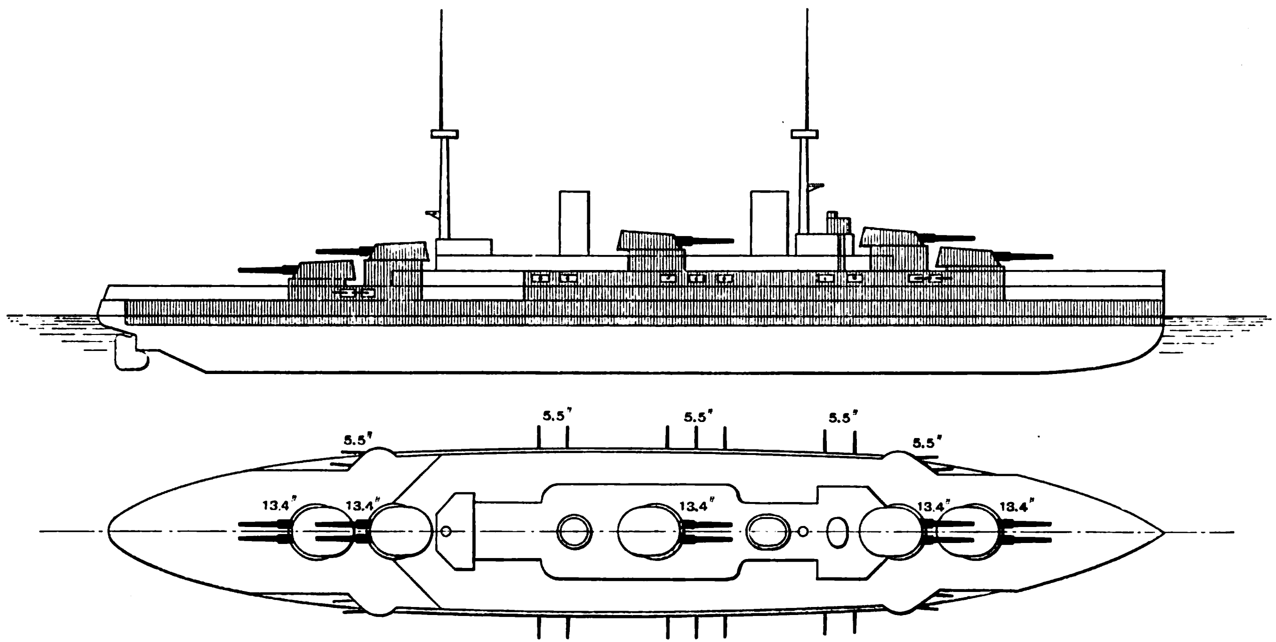
Length, 574 ft.; 24,800 tons; Speed, 21 knots; Projected; Armament, 12—13·4 in., 24—5·5 in., 4—3 pr.

See page 240.

FRANCE.

BATTLESHIPS.

Bretagne. Provence. Lorraine.



Length, 546 ft.; 23,600 tons; Speed, 19 knots; Building;
Armament, 10—13·4 in., 22—5·5 in.

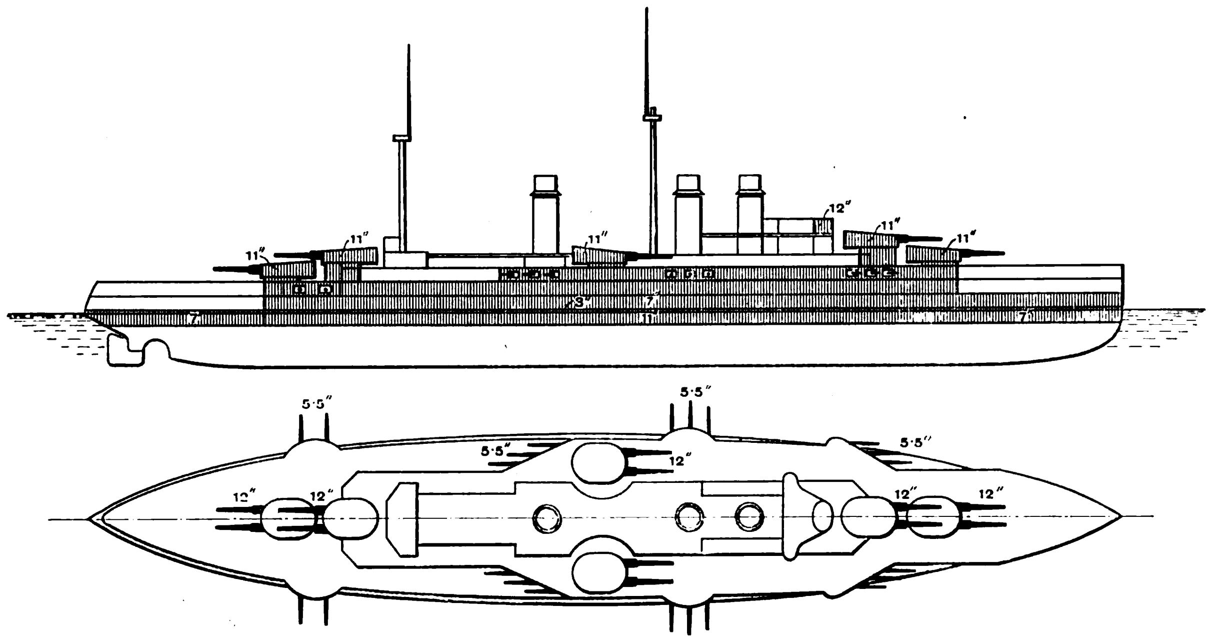
See page 239.

PLATE 24.

FRANCE.

BATTLESHIPS.

Jean Bart. Courbet. France. Paris.



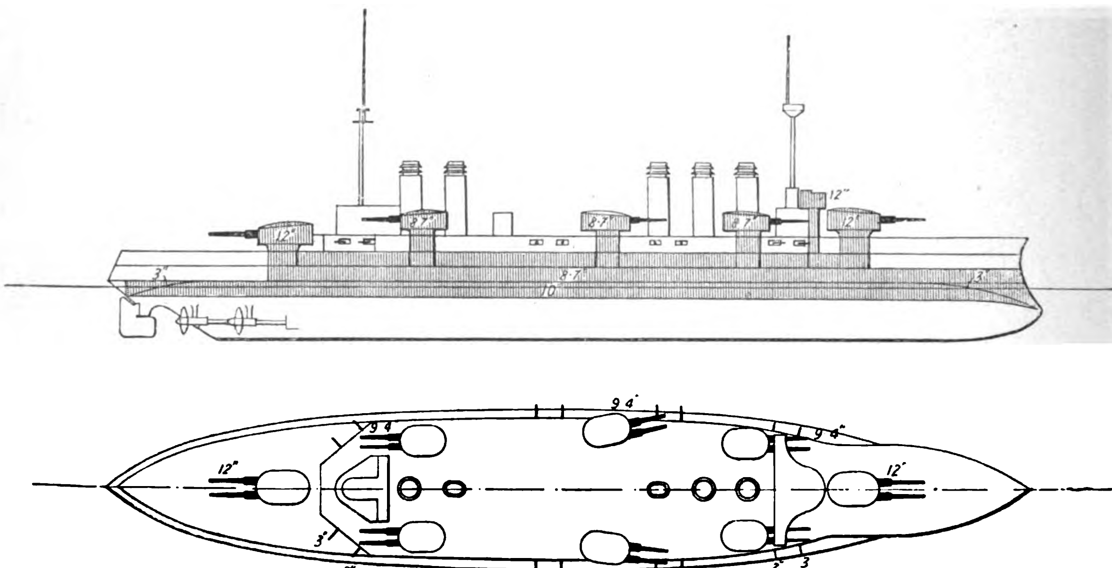
Length, 541 ft.; 23,096 tons; Speed, 20 knots; Building;
Armament, 12—12 in., 22—5·5 in.

See page 241.

FRANCE.

BATTLESHIPS.

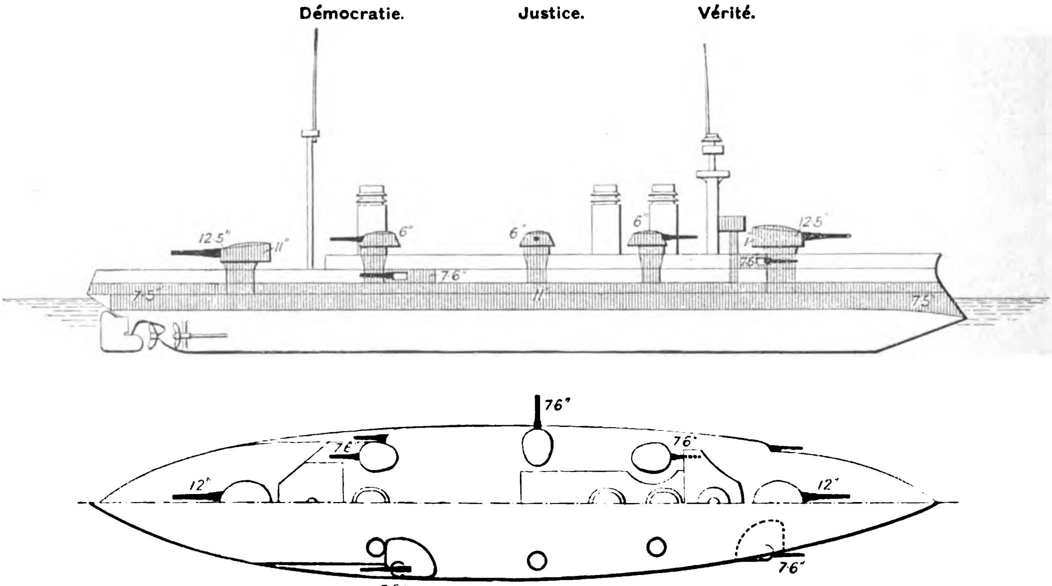
Condorcet. Danton. Diderot. Mirabeau. Vergniaud. Voltaire



Length, 476 ft.; 17,710 tons; Speed, 19 knots; Completed, 1911; Armament, 4—12 in., 12—9·4 in., 16—12 pr., 10 small.

See page 239.

Démocratie. Justice. Vérité.



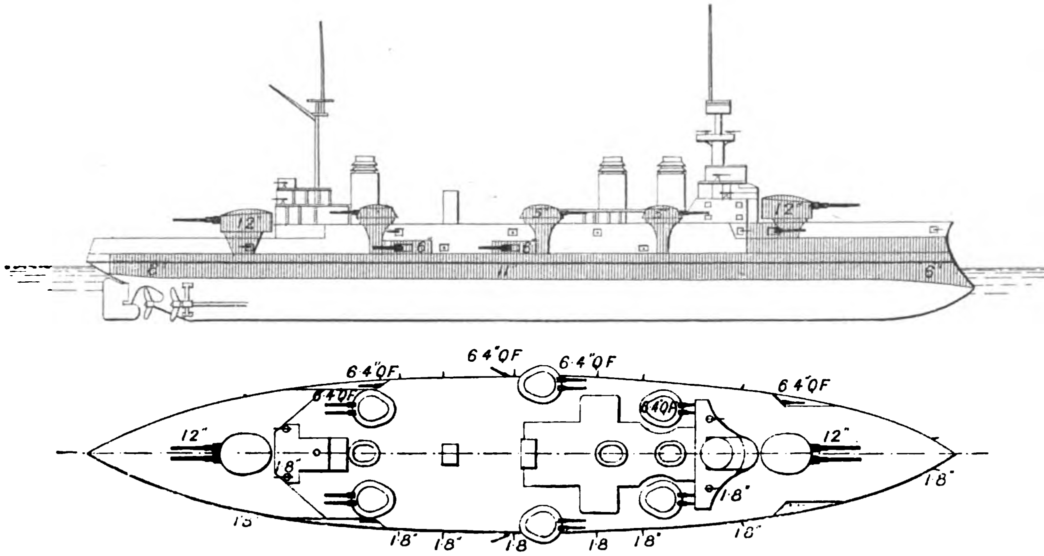
Length, 439 ft.; 14,635 tons; Speed, 19·3 knots; Completed, 1907–1908; Armament, 4—12 in., 16—7·6 in., 28 small.

See page 239

FRANCE.

BATTLESHIPS.

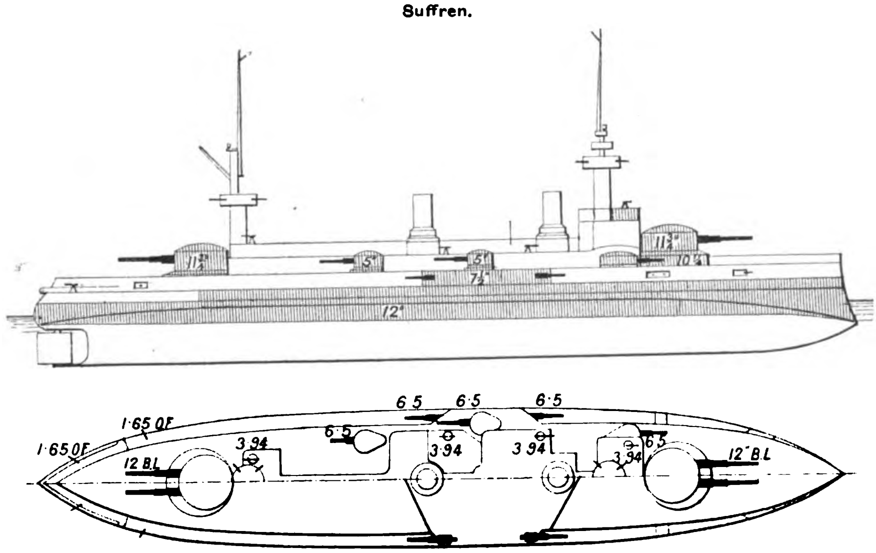
Patrie. **République.**



Length, 439 ft. ; 14,635 tons ; Speed, 19·1 knots ; Completed, 1906 ;
Armament, 4—12 in., 18—6·4 in., 28 small.

See page 242.

Suffren.



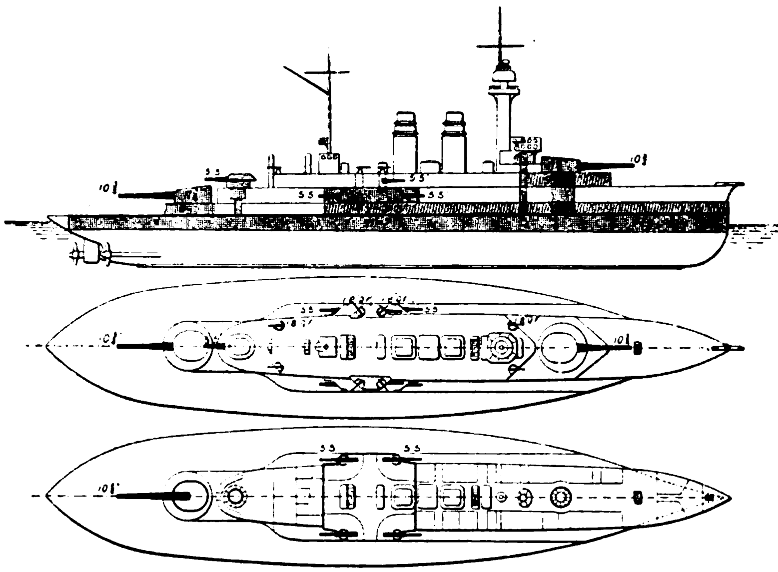
Length, 412 ft. ; 12,527 tons ; Speed, 18 knots ; Completed, 1903 ;
Armament, 4—12 in., 10—6·5 in., 8—3·9 in., 22 small.

See page 242.

FRANCE.

BATTLESHIPS.

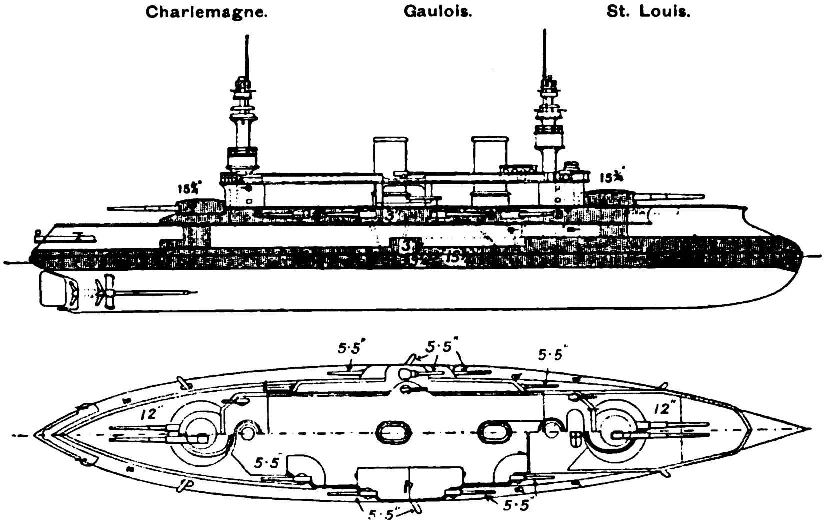
Henri IV.



Length, 354 ft. ; 8807 tons ; Speed, 17·2 knots ; Completed, 1903 ;
Armament, 2—10·8 in., 7—5·5 in., 14 small.

See page 240.

Charlemagne. Gaulois. St. Louis.



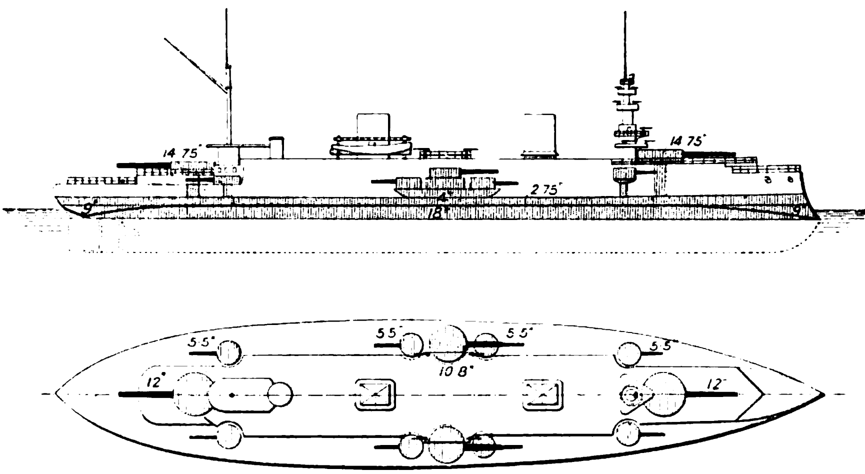
Length, 385 ft. ; 11,108 tons ; Speed, 18 knots ; Completed, 1898-1900 ;
Armament, 4—12 in., 10—5·5 in., 8—3·9 in., 34 small.

See page 239.

FRANCE.

BATTLESHIPS.

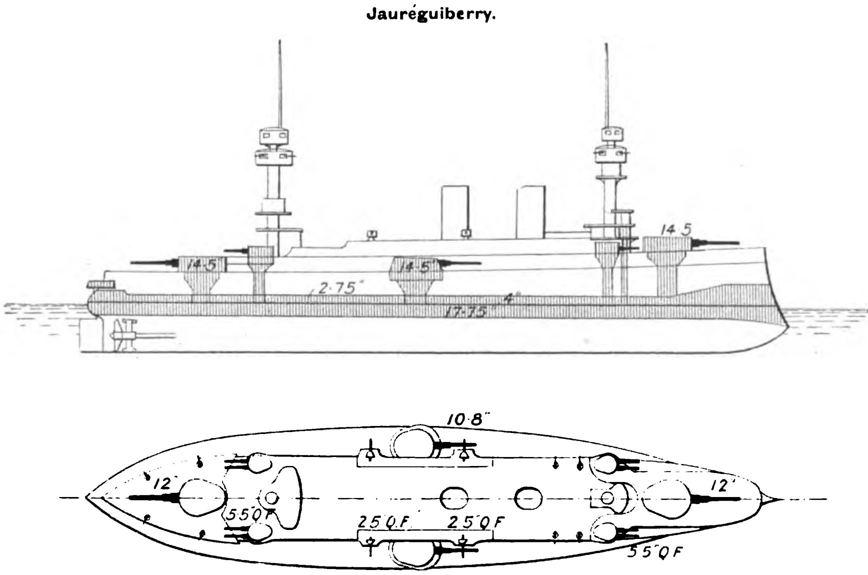
Carnot.



Length, 382 ft.; 11,954 tons; Speed, 17·8 knots; Completed, 1896;
Armament, 2—12 in., 2—10·8 in., 8—5·5 in., 30 small.

See page 239.

Jauréguiberry.



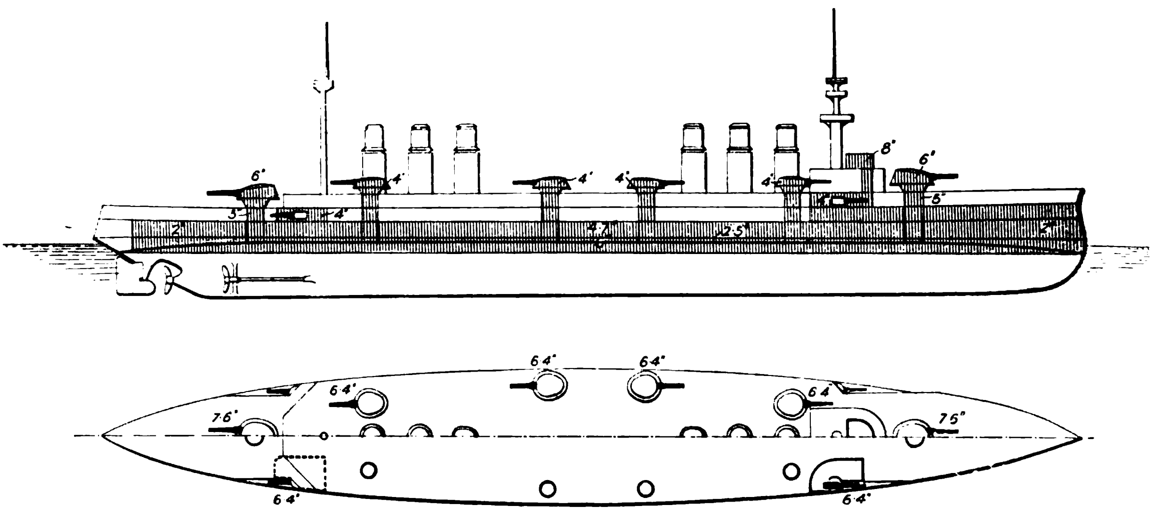
Length, 364 ft.; 11,637 tons; Speed, 18 knots; Completed, 1896;
Armament, 2—12 in., 2—10·8 in., 8—5·5 in., 32 small.

See page 240

FRANCE.

ARMOURED CRUISERS.

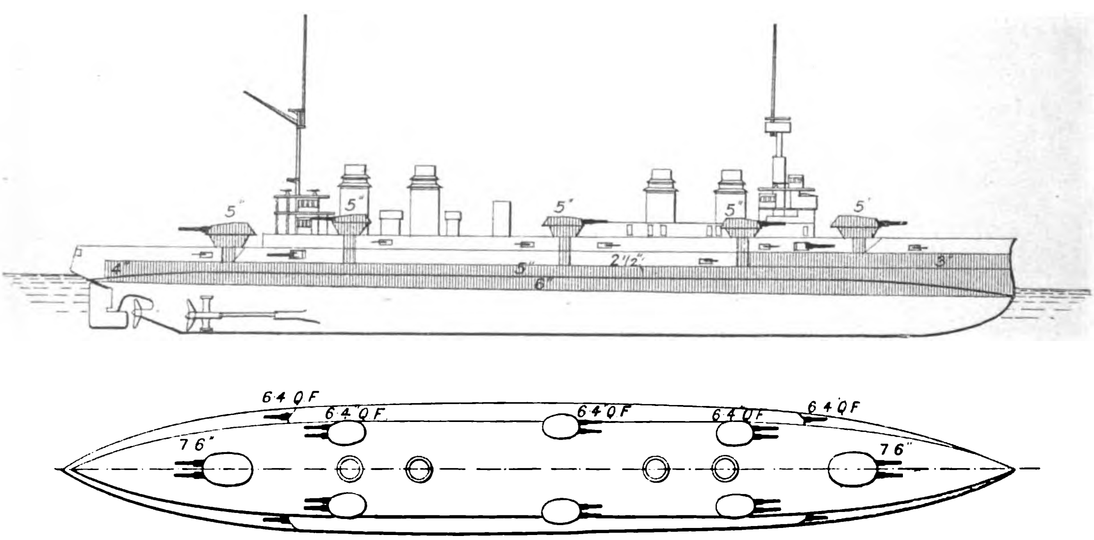
Ernest Renan.



Length, 515 ft. ; 13,427 tons ; Speed, 24·2 knots ; Completed, 1909 ;
Armament, 4—7·6 in., 16—6·4 in., 24 small.

See page 240.

Jules Ferry. Léon Gambetta. Victor Hugo.



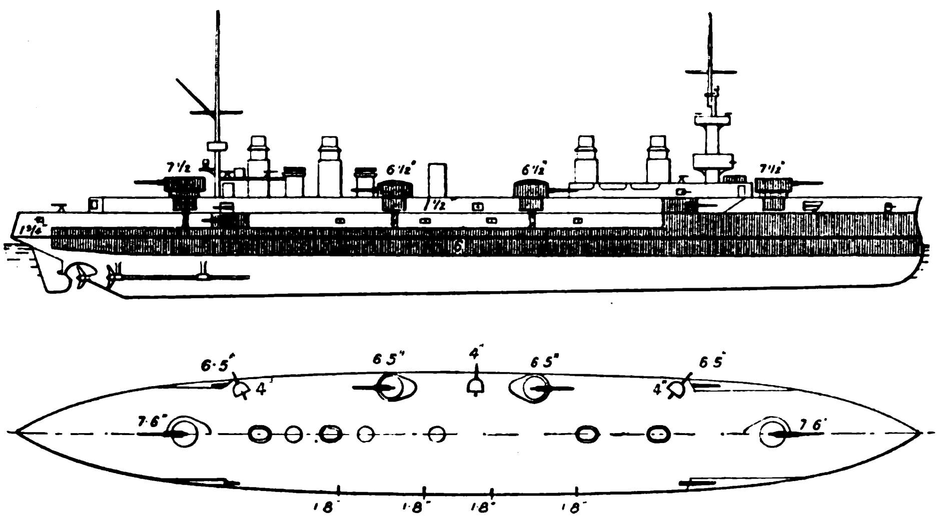
Length, 480 ft. ; 12,351 tons ; Speed, 22·5-23 knots ; Completed, 1904-1906 ;
Armament, 4—7·6 in., 16—6·4 in., 24 small.

See page 241.

FRANCE.

ARMOURED CRUISERS.

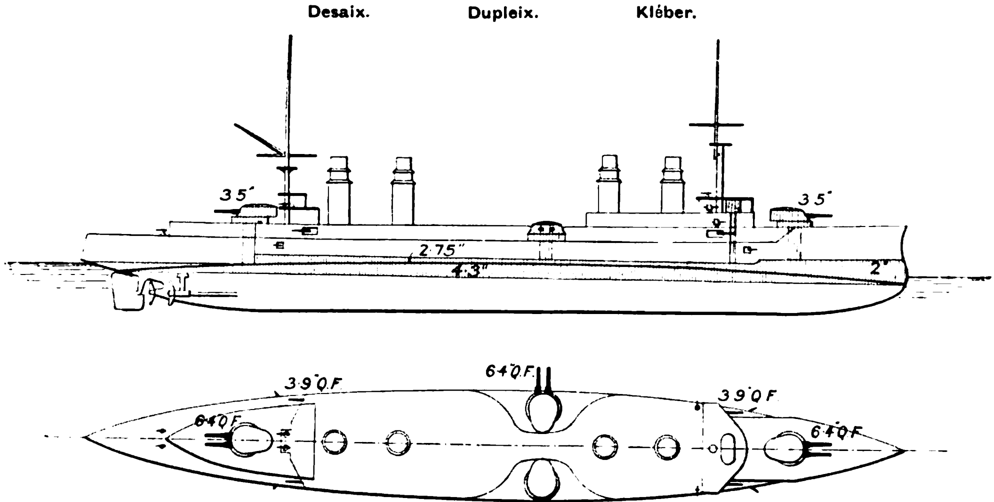
Aube. Condé. Gloire. Marseillaise.



Length, 453 ft.; 9856 tons; Speed, 21–21·9 knots; Completed, 1903–1904;
Armament, 2—7·6 in., 8—6·4 in., 6—4 in., 20 small.

See page 239.

Desaix. Dupleix. Kléber.



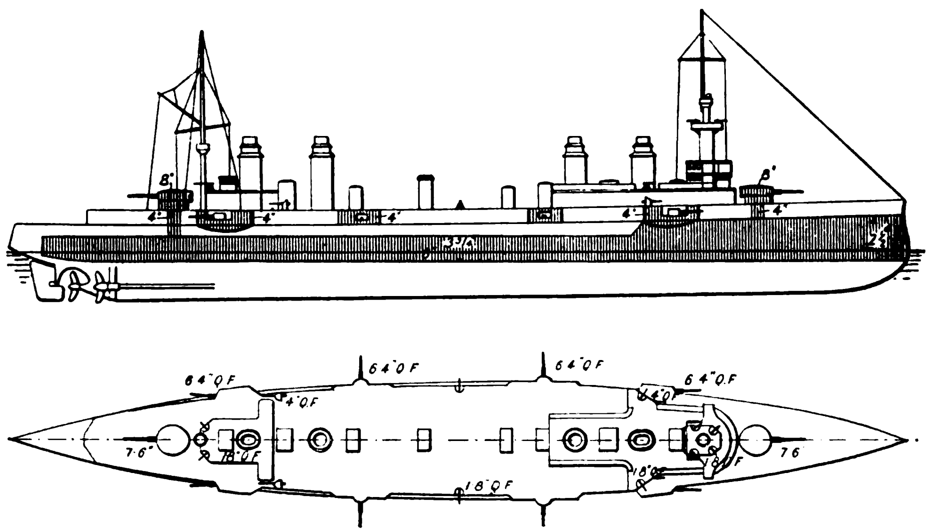
Length, 426 ft.; 7578 tons; Speed, 21–21·7 knots; Completed, 1903;
Armament, 8—6·4 in., 4—3·9 in., 14 small.

See page 240.

FRANCE.

ARMOURED CRUISERS.

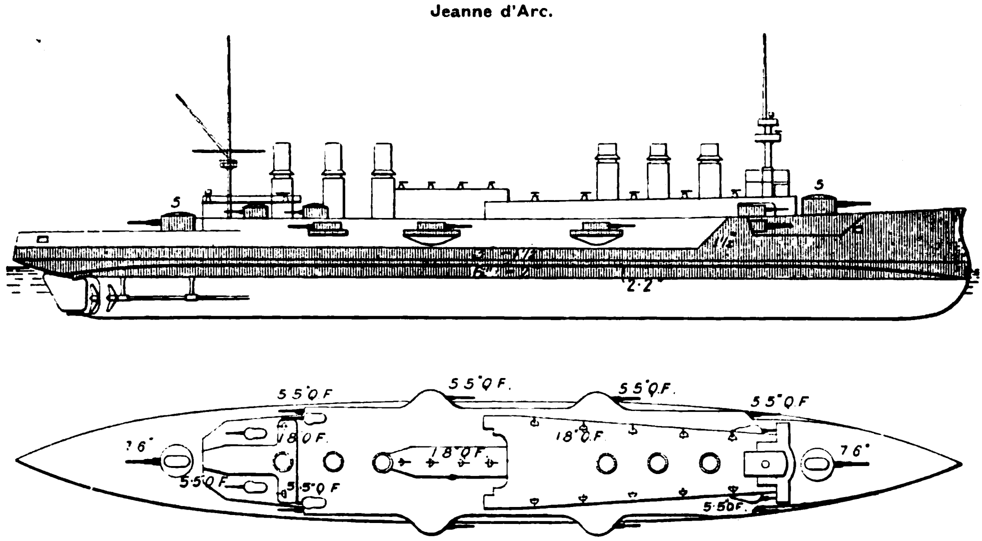
Dupetit-Thouars. Gueydon. Montcalm.



Length, 453 ft. : 9367 tons ; Speed, 21-22·5 knots ; Completed, 1902-1905 ;
Armament, 2—7·6 in., 8—6·4 in., 4—4 in., 22 small.

See page 240.

Jeanne d'Arc.



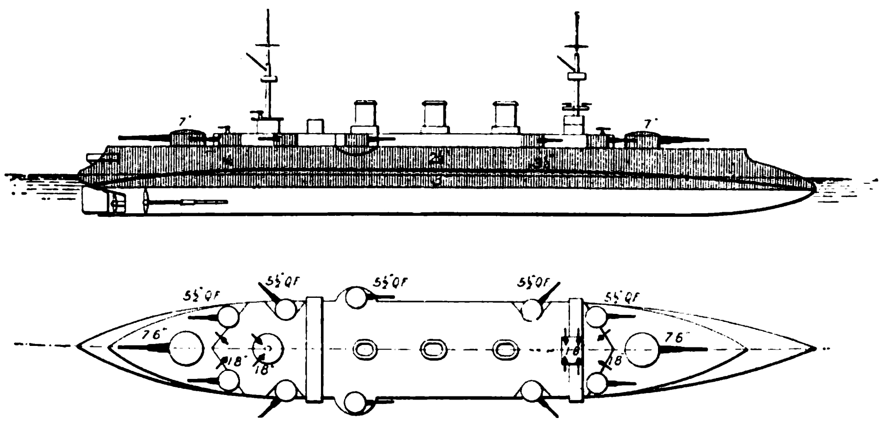
Length, 477 ft. : 11.092 tons ; Speed, 21·7 knots ; Completed, 1903 ;
Armament, 2—7·6 in., 14—5·5 in., 26 small.

See page 241.

FRANCE.

ARMOURED CRUISER.

Pothuau.

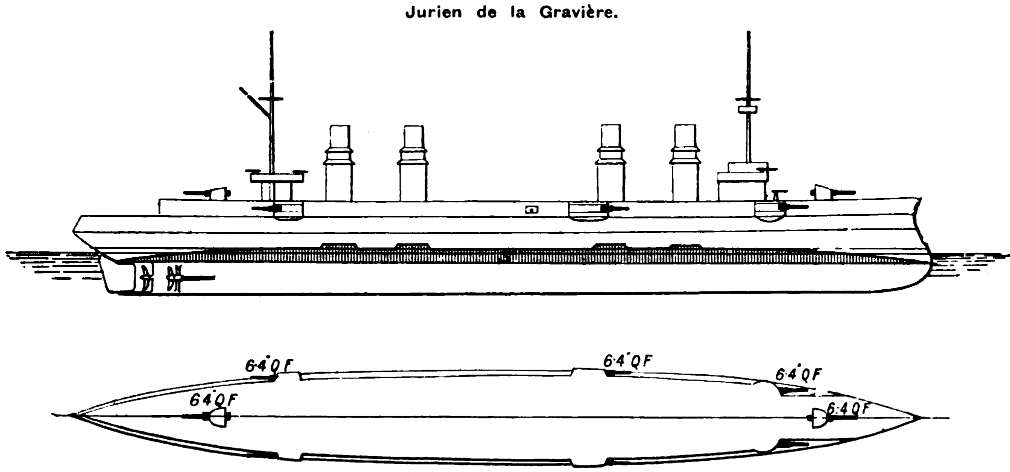


Length, 370 ft. ; 5374 tons ; Speed, 19·2 knots ; Completed, 1896 ;
Armament, 2 –7·6 in., 10—5·5 in., 24 small.

See page 242.

CRUISER.

Jurien de la Gravière.



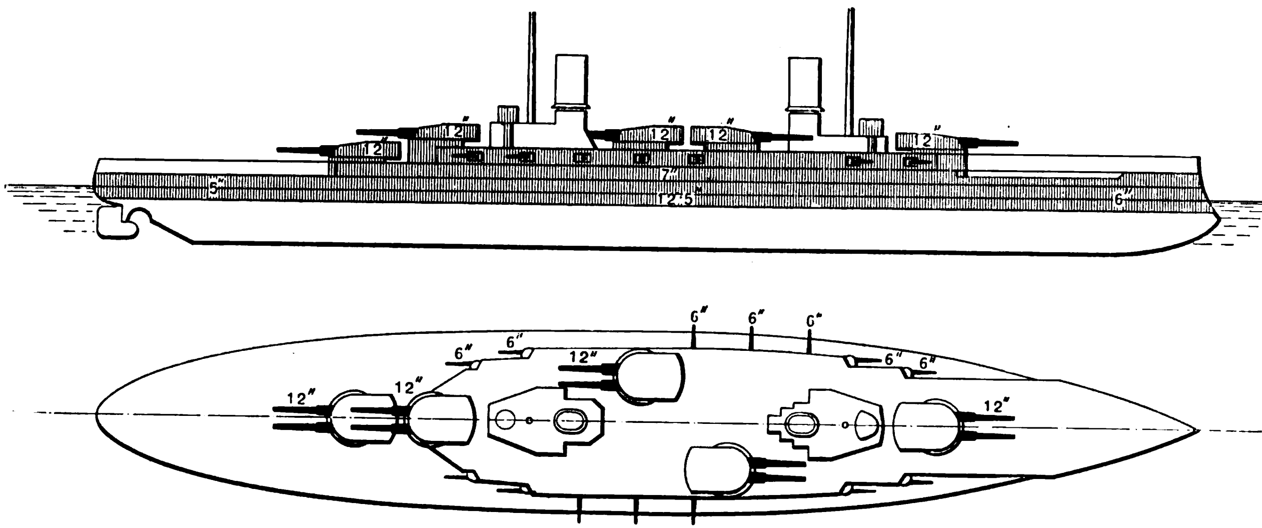
Length, 440 ft. ; 5595 tons ; Speed, 22·9 knots ; Completed, 1901 ;
Armament, 8—6·4 in., 12 small.

See page 244.

GERMANY.

BATTLESHIP.

Friedrich der Grosse.



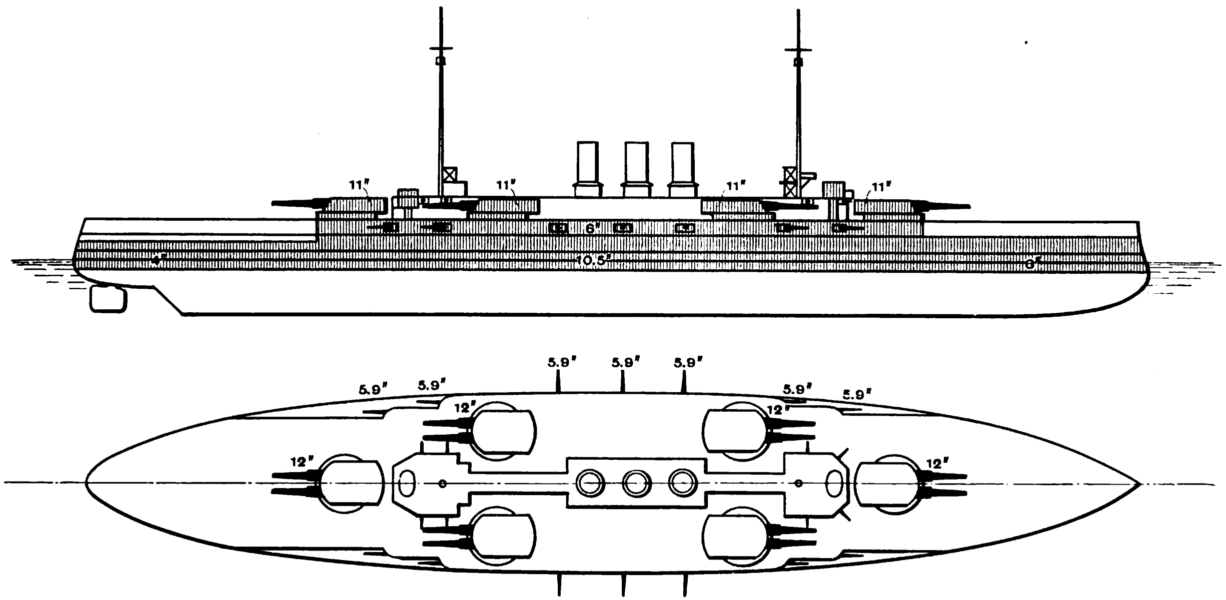
Length, 564 ft.; 24,310 tons; speed, 21 knots; Building;
Armament, 10—12 in.; 14—6 in.; 12—3·4 in..

See page 245.

GERMANY.

BATTLESHIPS.

Helgoland. **Oldenburg.** **Ostfriesland.** **Thuringen.**



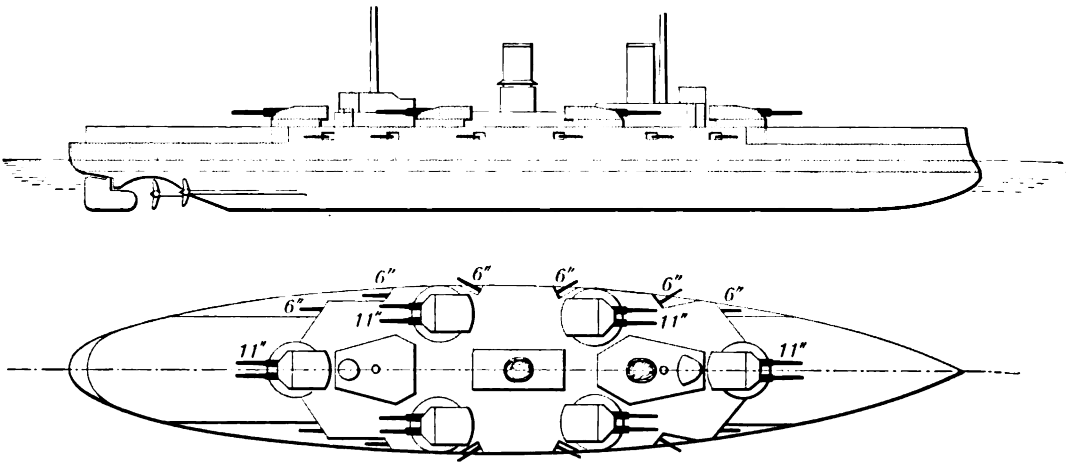
Length, 546 ft. ; 22,500 tons ; Speed, 20·5 knots ; Completed, 1911-12 ;
Armament, 12—12 in., 14—5·9 in., 14—3·4 in.

See page 245.

GERMANY.

BATTLESHIPS.

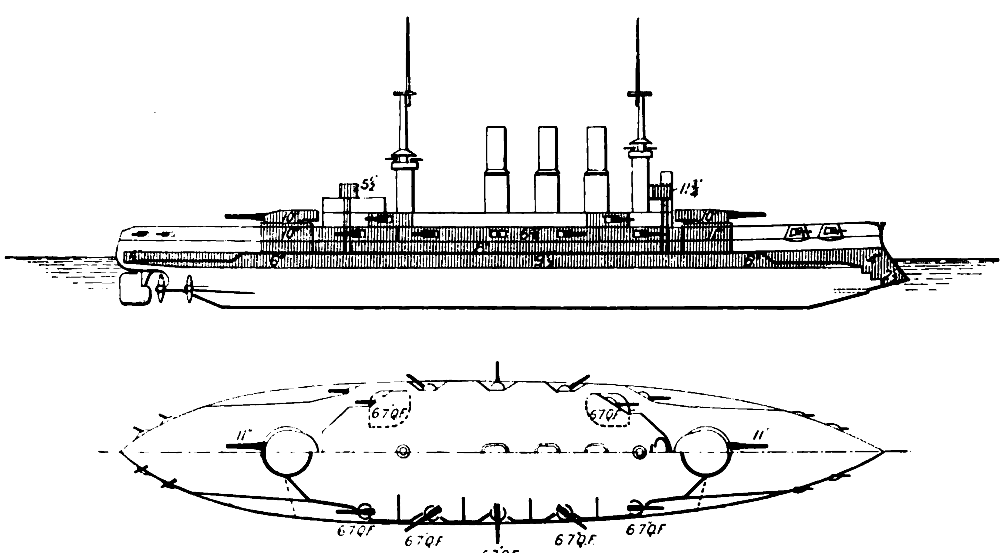
Nassau **Posen.** **Rheinland.** **Westfalen.**



Length, 455 ft.; 18,200 tons; Speed, 20 knots; Completed, 1909-1910; Armament, 12—11 in., 12—6 in., 16—3·4 in.

See page 246.

Deutschland. **Hannover.** **Pommern.** **Schlesien.** **Schleswig-Holstein.**



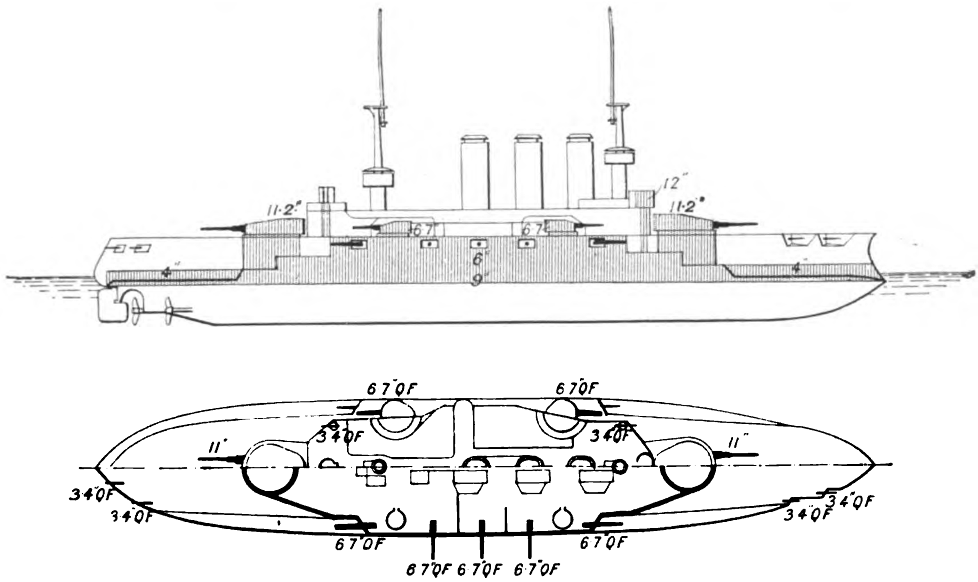
Length, 398 ft.; 13,040 tons; Speed, 18·5—19·2 knots; Completed, 1906-1909; Armament, 4—11 in., 14—6·7 in., 22—3·4 in., 8 small.

See page 245.

GERMANY.

BATTLESHIPS.

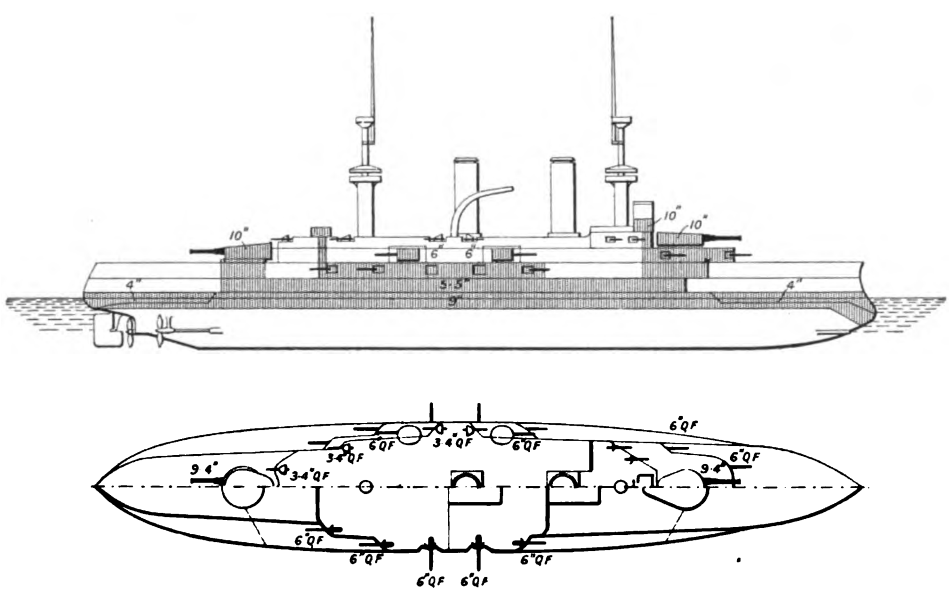
Braunschweig. **Elsass.** **Hessen.** **Lothringen.** **Preussen.**



Length, 398 ft.; 12,997 tons; Speed, 18—18·7 knots; Completed, 1904-1906;
Armament, 4—11 in., 14—6·7 in., 12—3·4 in., 20 small.

See page 245.

Mecklenburg. **Schwaben.** **Wettin.** **Wittelsbach.** **Zähringen.**



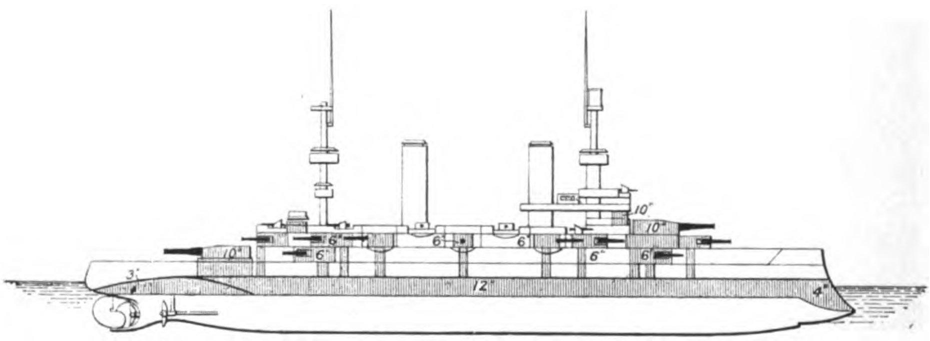
Length, 394 ft.; 11,643 tons; Speed, 18—19 knots; Completed, 1902-1903;
Armament, 4—9·4 in., 18—6 in., 12—3·4 in., 20 small.

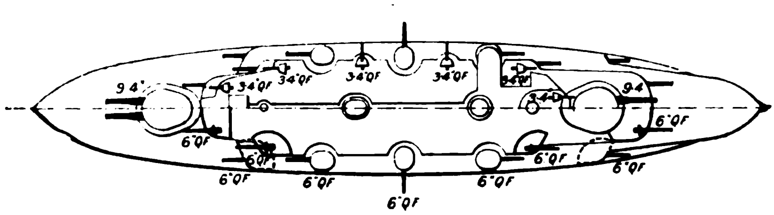
See page 246.

PLATE 37.

BATTLESHIPS.

Kaiser Friedrich III. Kaiser Karl der Grosse. Kaiser Wilhelm II. Kaiser Wilhelm der Grosse.





Length, 377 ft. ; 10,974 tons ; Speed, 18 knots ; Completed, 1898-1901 ;
Armament, 4—9·4 in., 18—6 in., 12—3·4 in., 20 small.
NOTE.—Superstructure is being cut down.

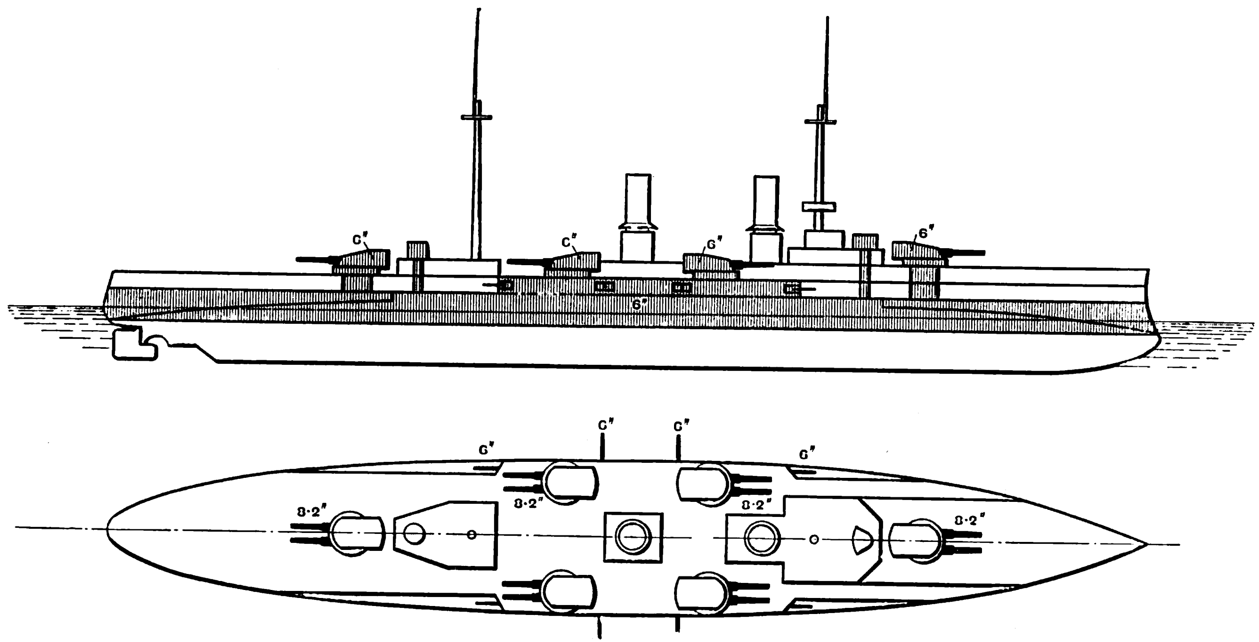
See page 246.

PLATE 38.

GERMANY.

ARMOURED CRUISER.

Blücher.



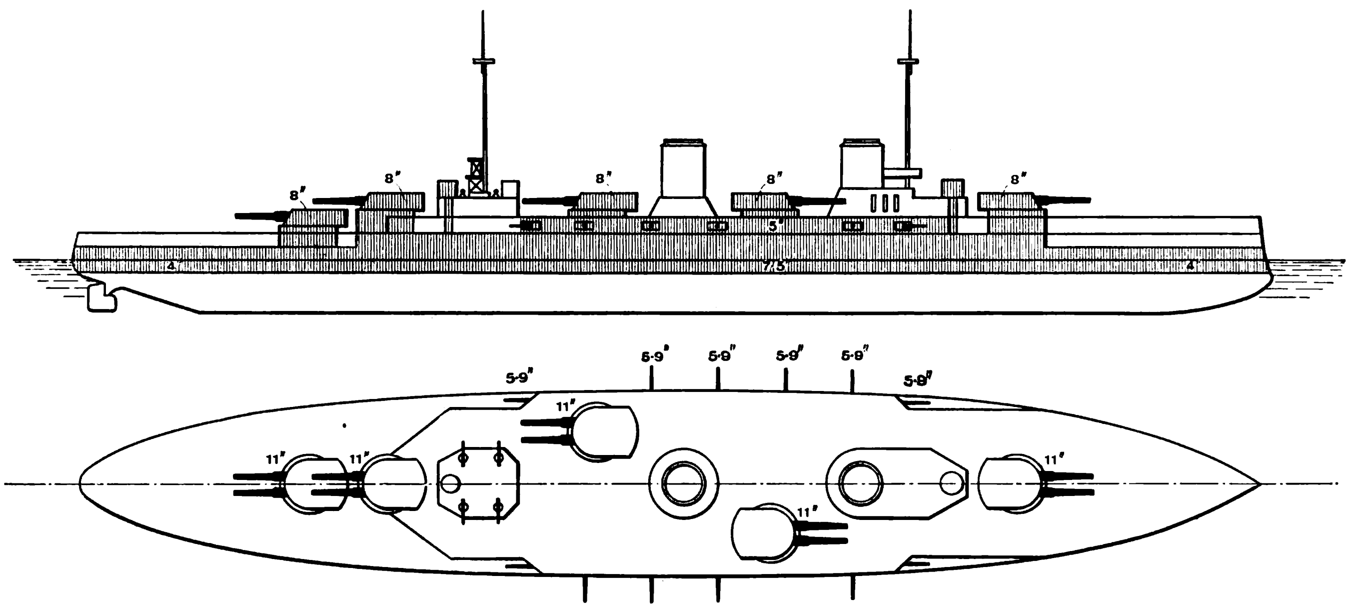
Length, 499 ft. ; 15,550 tons ; speed 25·3 knots ; Building ;
Armament, 12—8·2 in. ; 8—6 in. ; 16—3·4 in.

See page 245.

GERMANY.

ARMOURED CRUISERS.

Moltke. Goeben.



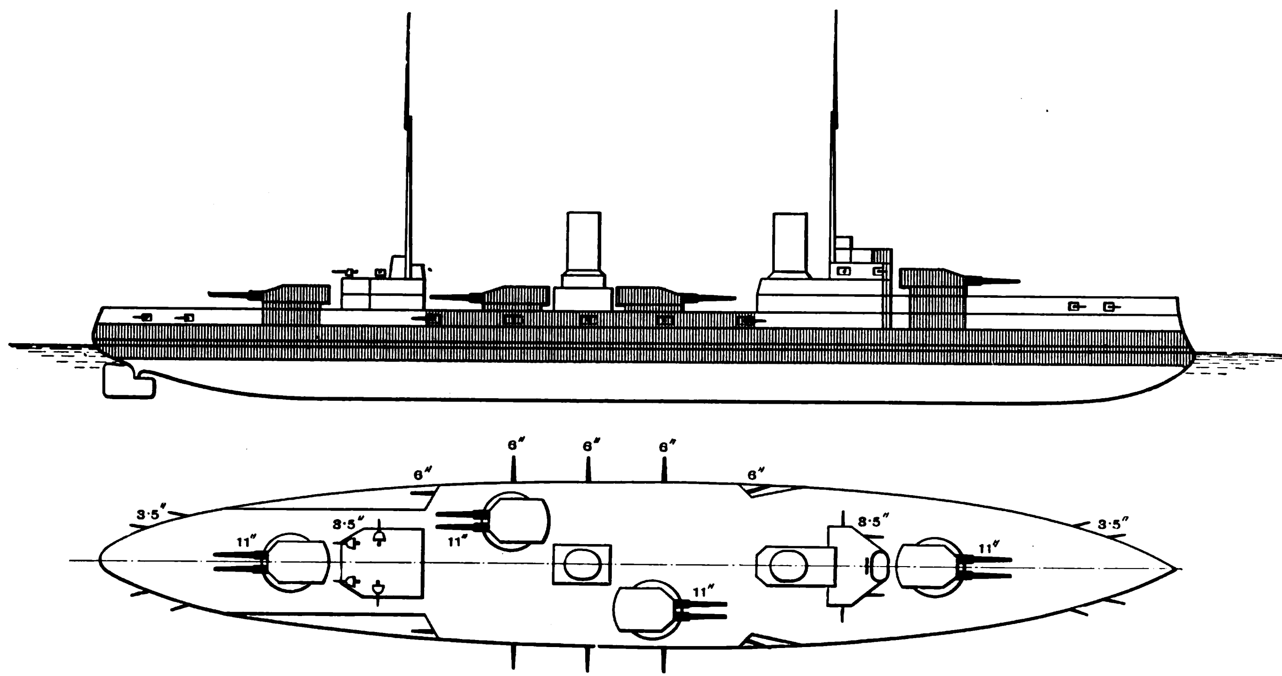
Length, 612 ft. ; 22,600 tons ; Speed, 28 knots ; Completed, 1911 and Building ; Armament, 10—11 in., 12—5·9 in., 12—3·4 in.

See page 246.

GERMANY.

ARMOURED CRUISER.

Von der Tann.



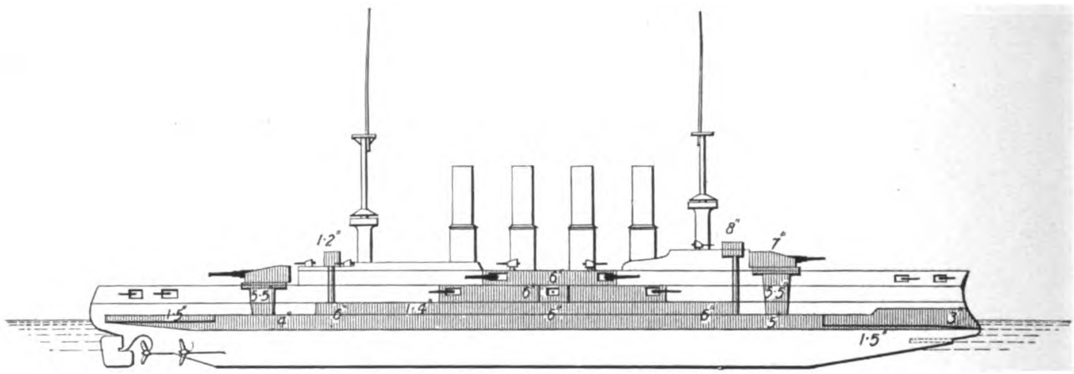
Length, 561 ft. ; 18,700 tons ; Speed, 27·6 knots ; Completed, 1911 ;
Armament, 8—11 in., 10—6 in., 16—3·5 in.

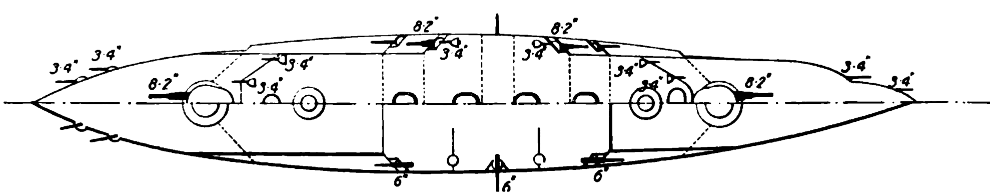
See page 247.

GERMANY.

ARMOURED CRUISERS.

Gneisenau. **Scharnhorst.**

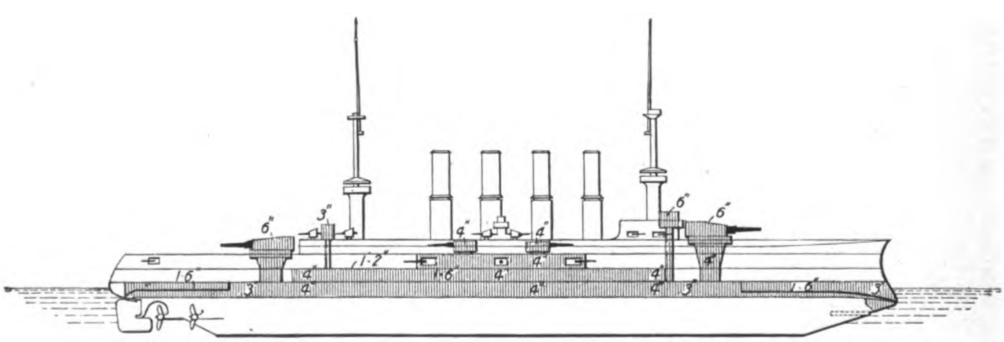


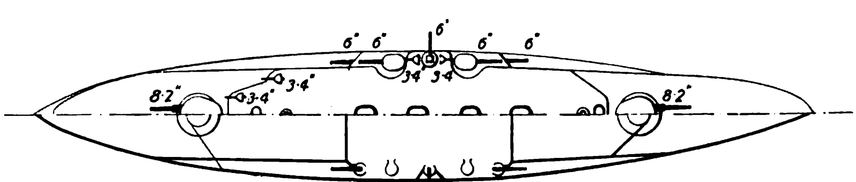


Length, 450 ft. ; 11,420 tons ; Speed, 22·5—23·8 knots ; Completed, 1908 ;
Armament, 8—8·2 in., 6—6 in., 20—3·4 in., 14 small.

See page 245.

Roon. **Yorck.**





Length, 403 ft. ; 9350 tons ; Speed, 21·1 knots ; Completed, 1905 ;
Armament, 4—8·2 in., 10—6 in., 16—3·4 in., 14 small.

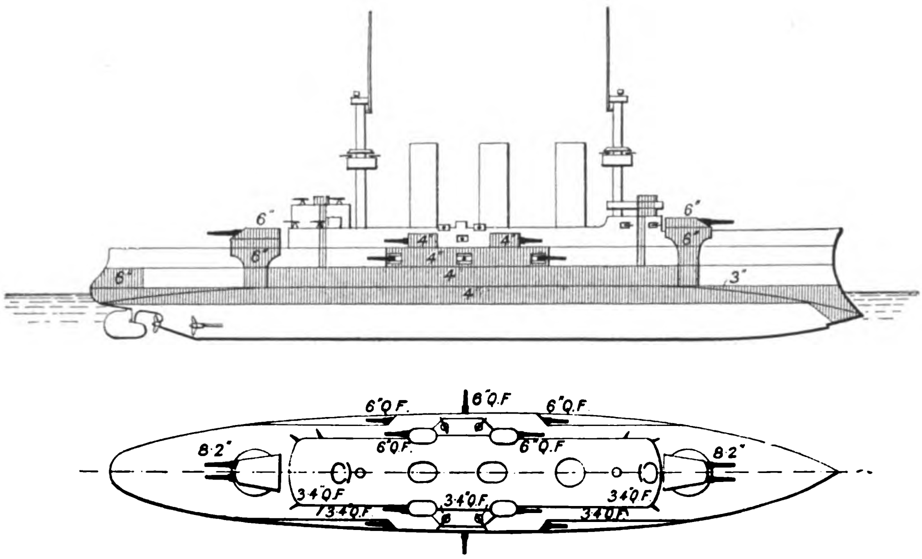
See page 247.

PLATE 42.

GERMANY.

ARMOURED CRUISERS.

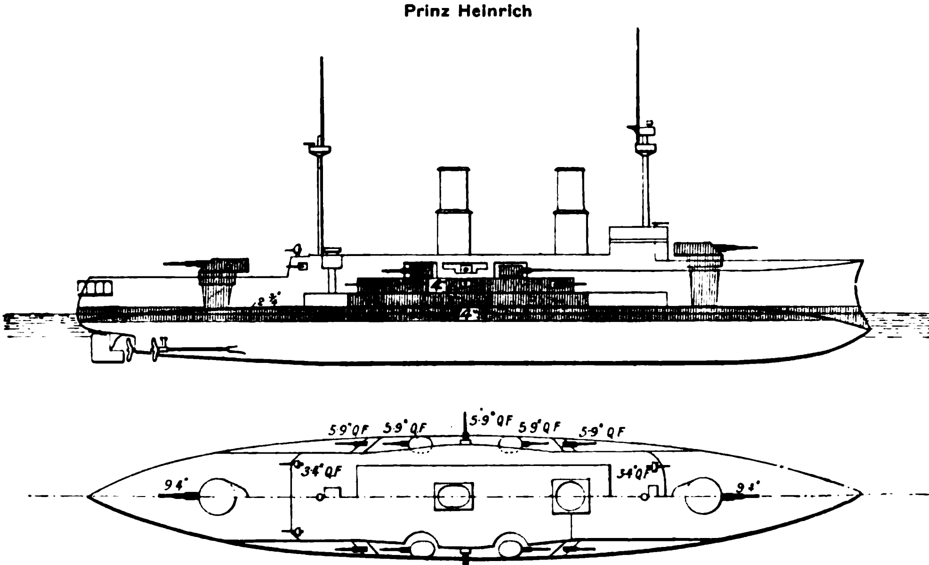
Prinz Adalbert. **Friedrich Karl.**



Length, 393 ft.; 8858 tons; Speed, 20·3—20·5 knots; Completed, 1903–1904;
Armament, 4—8·2 in., 10—6 in., 12—3·4 in., 18 small.

See page 247.

Prinz Heinrich



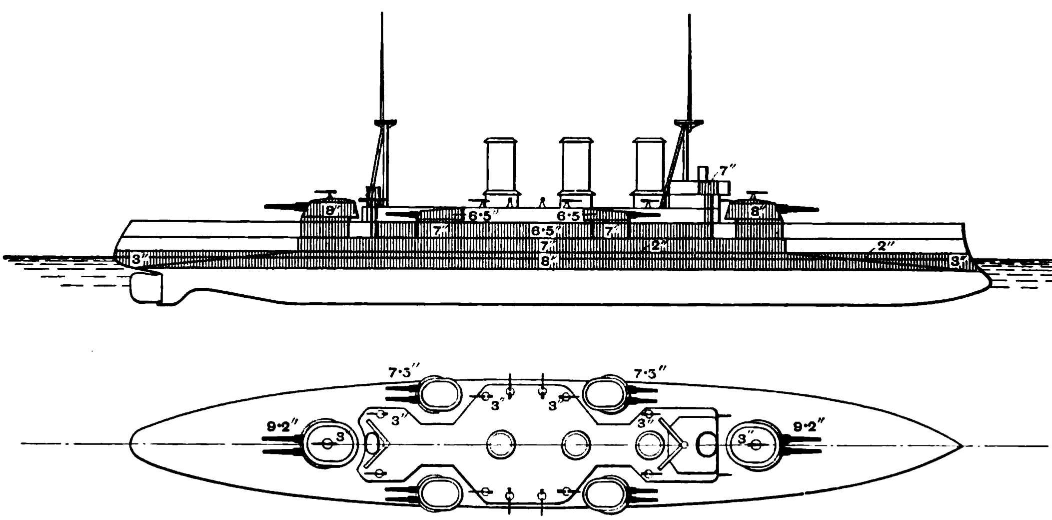
Length, 396 ft.; 8759 tons; Speed, 20 knots; Completed, 1902;
Armament, 2—9·4 in., 10—5·9 in., 10—3·4 in., 14 small.

See page 247.

GREECE.

ARMOURED CRUISER.

Giorgios Averoff.



Length, 430 ft.; 9956 tons; Speed, 24 knots; Completed, 1911;
Armament, 4—9·2 in., 8—7·5 in., 16—3 in.

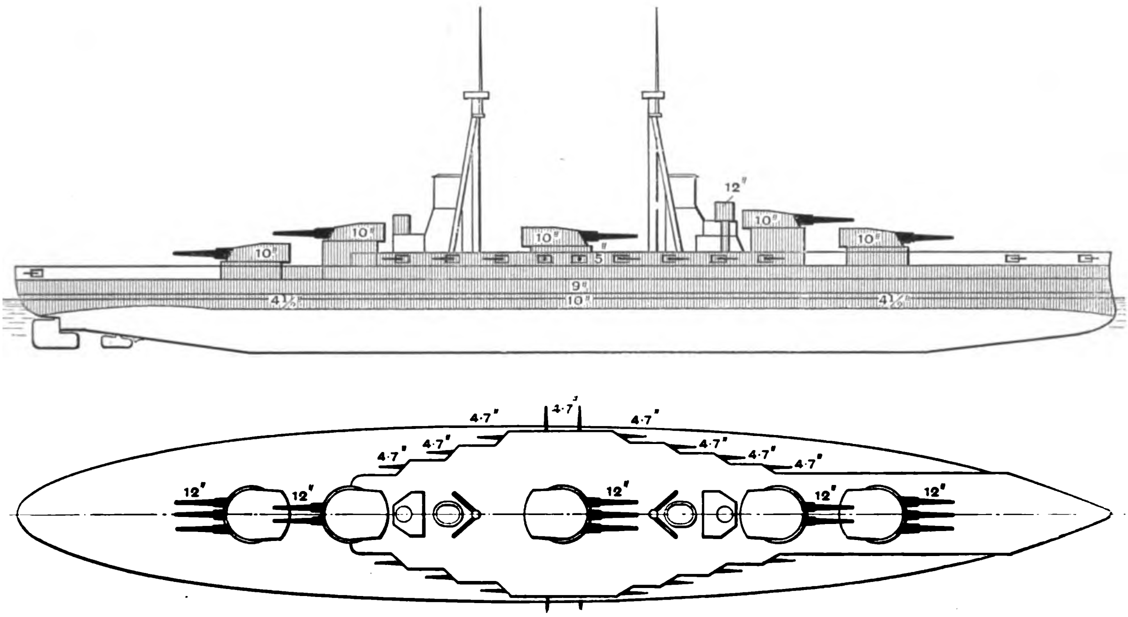
See page 252.

PLATE 44.

ITALY.

BATTLESHIPS.

Conte di Cavour **Giulio Cesare.** **Leonardo da Vinci.** ***Andrea Doria.** ***Duilio.**

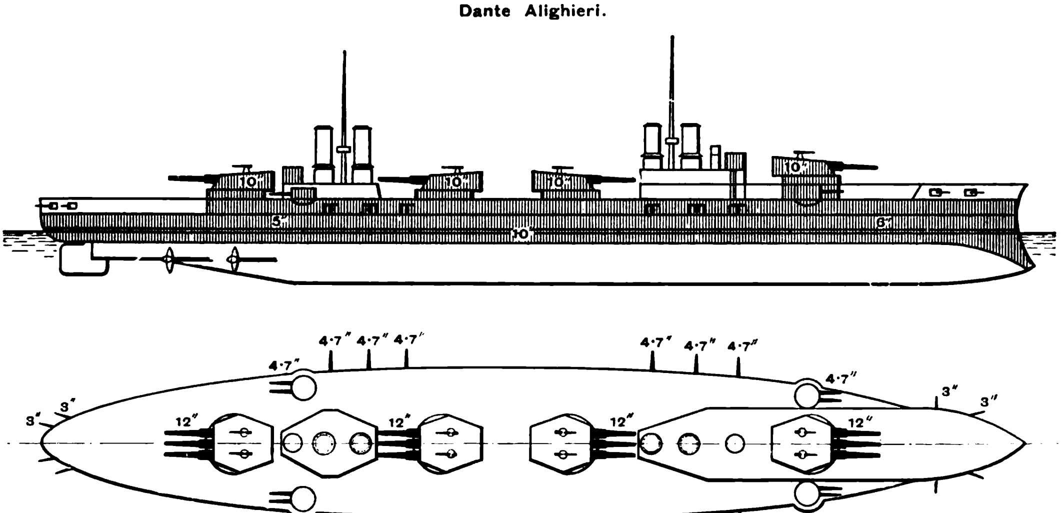


Length, 557 ft. ; 21,500 tons ; Speed, 22·5–23 knots ; Building ;
Armament, 13—12 in., 20—4·7 in., 14—12 pr.

* These vessels are 570 ft. and have 16—5·9-in. guns.

See page 253.

Dante Alighieri.



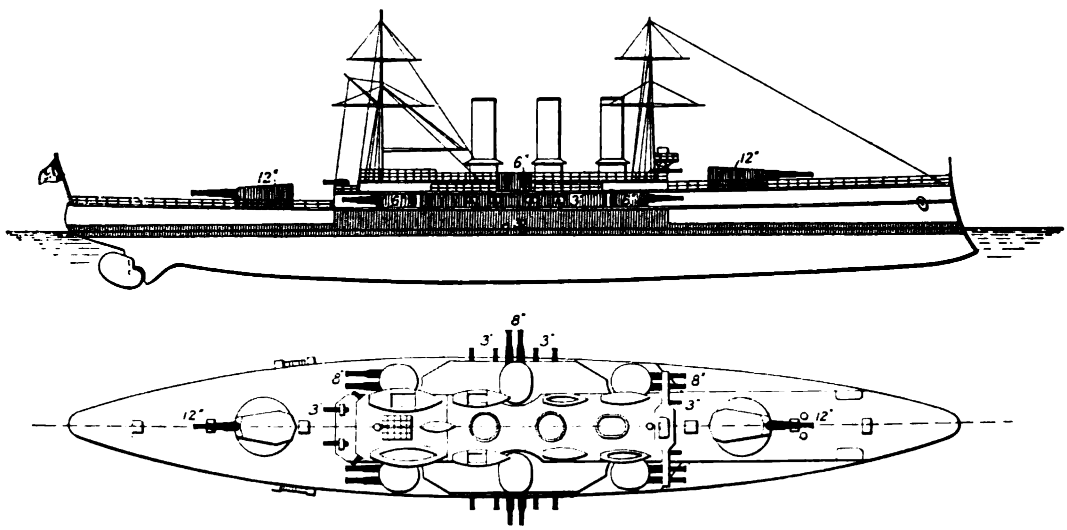
Length, 505 ft. ; 18,300 tons ; Speed, 23 knots ; Completed, 1912 ;
Armament, 12—12 in., 20—4·7 in., 16—3 in.

See page 253.

ITALY.

BATTLESHIPS.

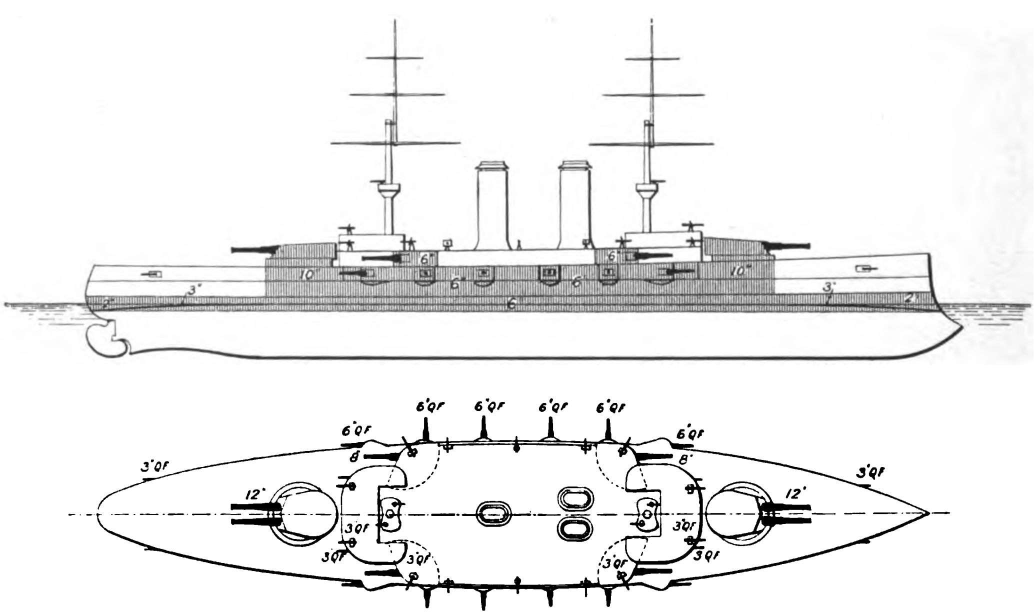
Napoli. **Regina Elena.** **Roma.** **Vittorio Emanuele.**



Length, 435 ft. ; 12,425 tons ; Speed, 22 knots ; Completed, 1907—1909 ;
Armament, 2—12 in., 12—8 in., 12—3 in., 12 small.

See page 254.

Benedetto Brin. **Regina Margherita.**



Length, 426 ft. ; 13,214 tons ; Speed, 19·5-20·2 knots ; Completed, 1904 ;
Armament, 4—12 in., 4—8 in., 12—6 in., 16—3 in. 12 small.

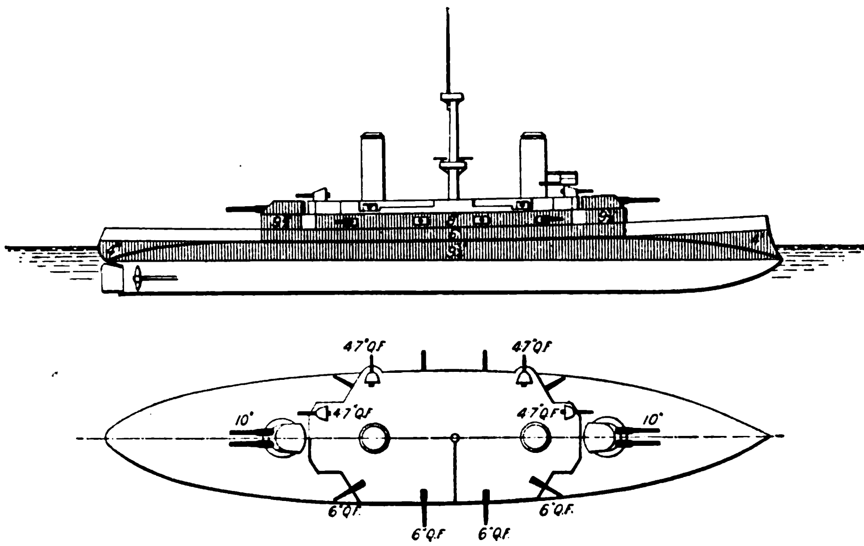
See page 253.

PLATE 46.

ITALY.

BATTLESHIPS.

Ammiraglio di St. Bon. **Emanuele Filiberto.**

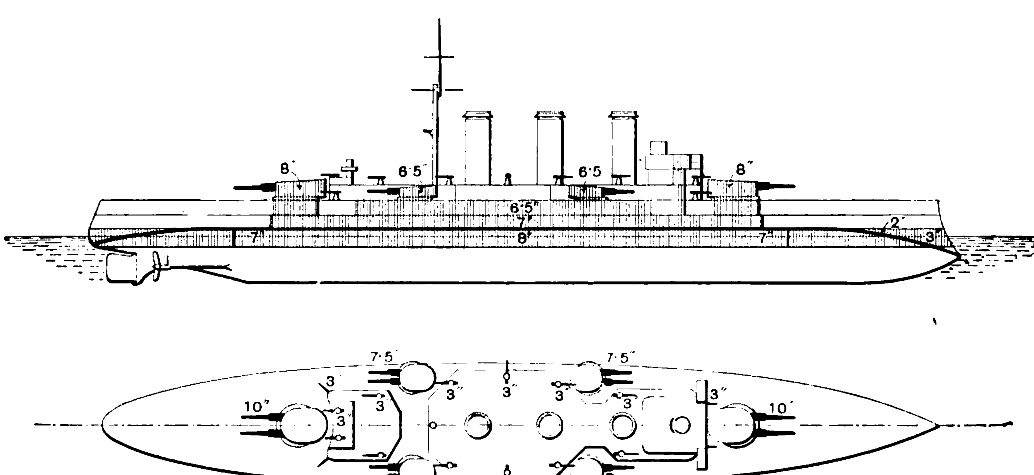


Length, 344 ft. ; 9645 tons ; Speed, 18·3 knots ; Completed, 1901-1902 ;
Armament, 4—10 in., 8—6 in., 8—4·7 in., 2—2·9 in., 22 small.

See page 253.

ARMOURED CRUISERS

Amalfi. **Pisa.**



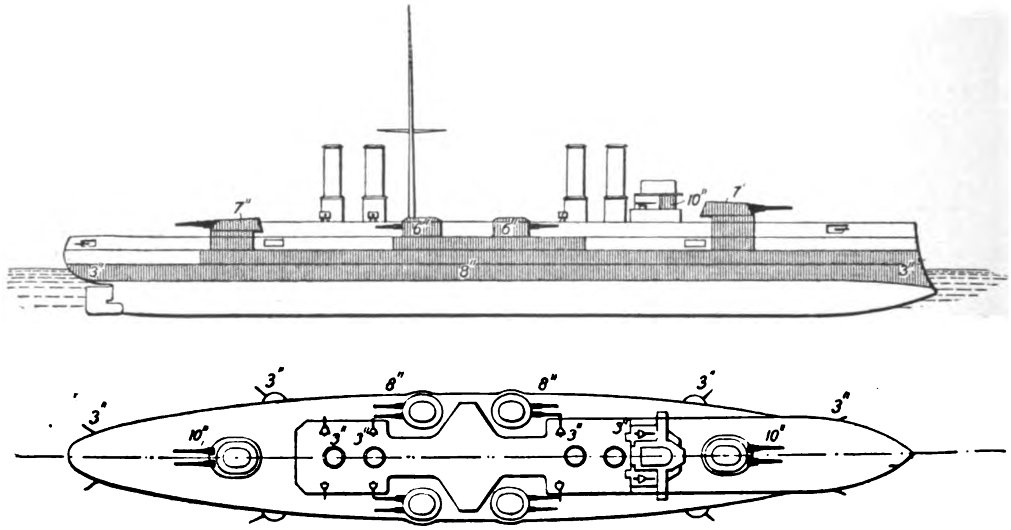
Length, 430 ft. ; 9,832 tons ; Speed, 23 knots ; Completed, 1909 ;
Armament, 4—10 in., 8—7·5 in., 16—3 in., 2 small.

See page 253.

ITALY.

ARMOURED CRUISERS.

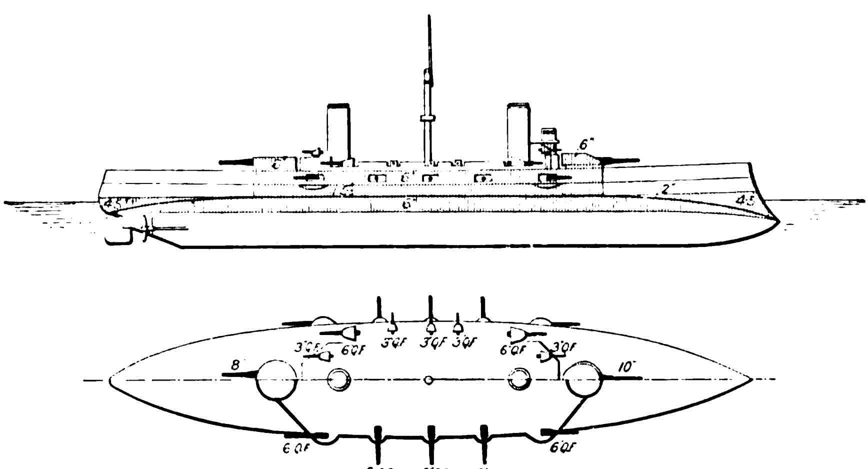
S. Giorgio. S. Marco.



Length, 430 ft. ; 9832 tons ; Speed, 22·5 knots ; Completed, 1910 ;
Armament, 4—10 in., 8—8 in., 16—3 in.

See page 254.

Francesco Ferruccio. Giuseppe Garibaldi. Varese.



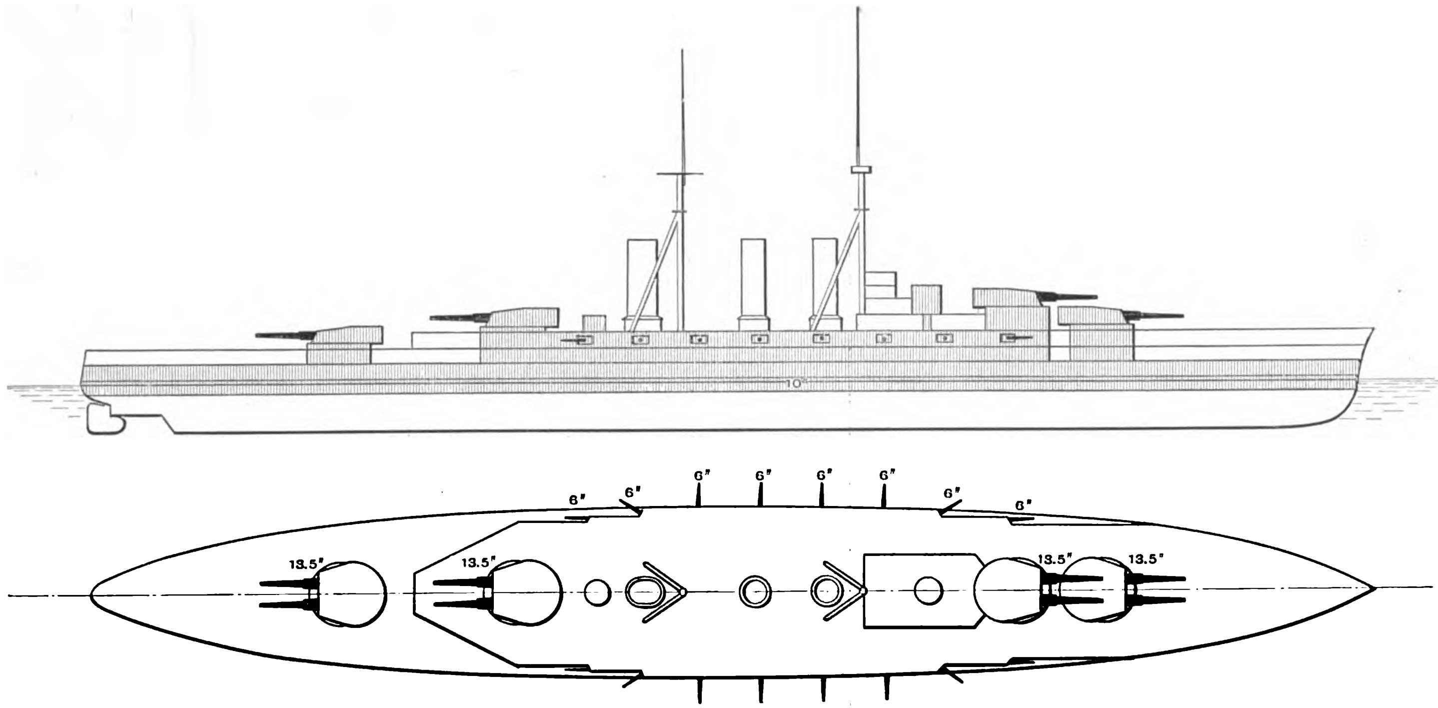
Length, 344 ft. ; 7234 tons ; Speed, 20 knots ; Completed, 1900–1904 ;
Armament, 1—10 in., 2—8 in., 14—6 in., 10—3 in., 8 small.

See page 253.

JAPAN.

BATTLESHIPS.

Hiyei. Haruna. Kirishima. Kongo.



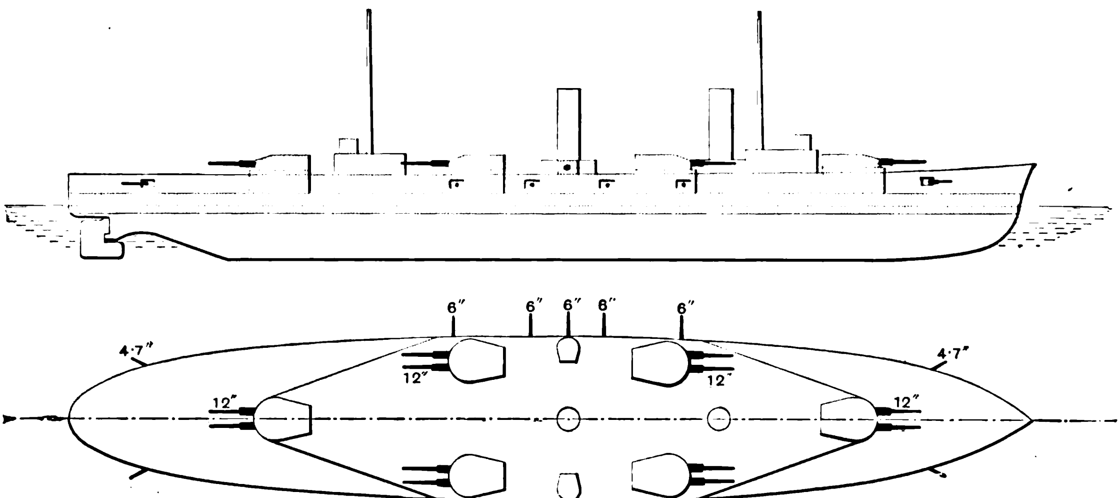
Length, 704 ft. ; 27,500 tons ; Speed, 27 knots ; Building ;
Armament, 8—13·5 in., 16—6 in.

See page 257.

JAPAN.

BATTLESHIPS.

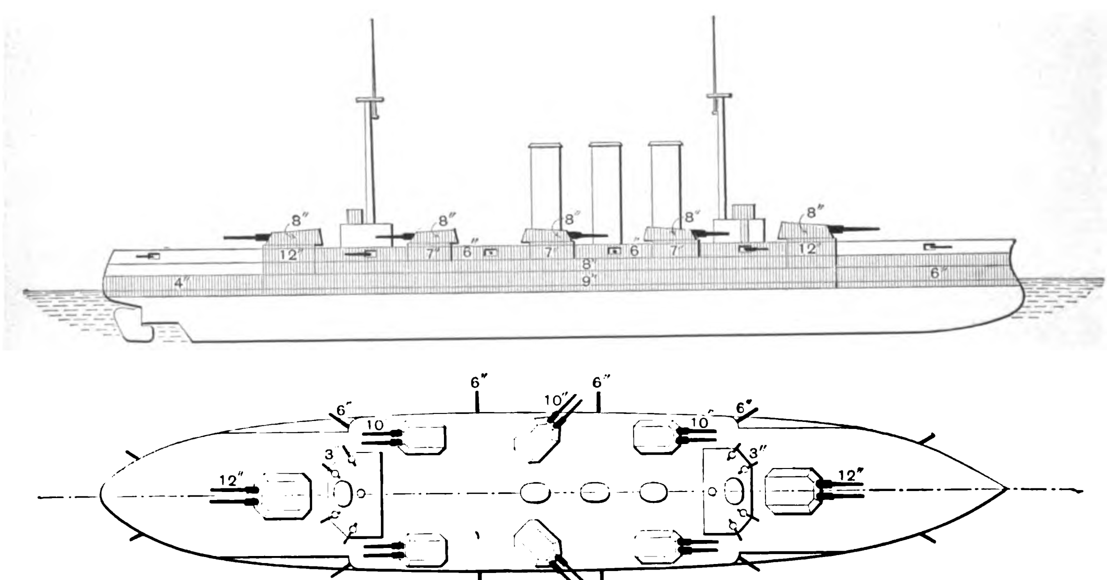
Kawachi. **Settsu.**



Length 480 ft. ; 20,800 tons ; Speed, 20·5 knots ; Completed, 1912 ;
Armament, 12—12 in. ; 10—6 in. ; 12—4·7 in.

See page 258.

Aki.



Length, 482 ft. ; 19,800 tons ; Speed, 20·5 knots ; Completed 1911 ;
Armament, 4—12 in., 12—10 in., 8—6 in., 8—12 pr., 4 small.

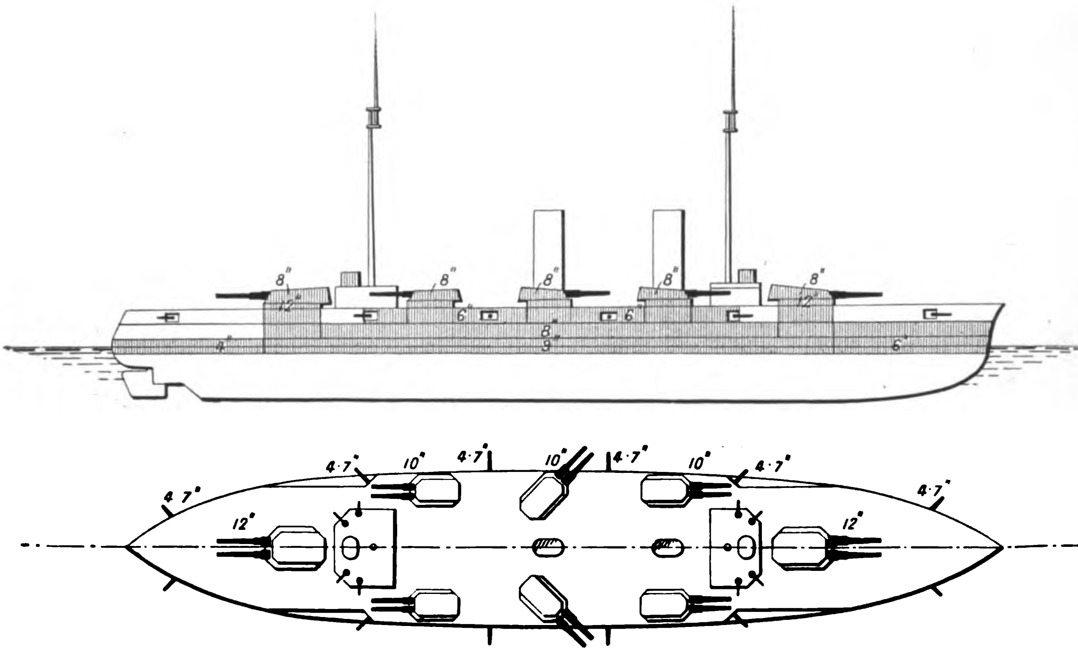
See page 257.

Plate 50.

JAPAN.

BATTLESHIPS.

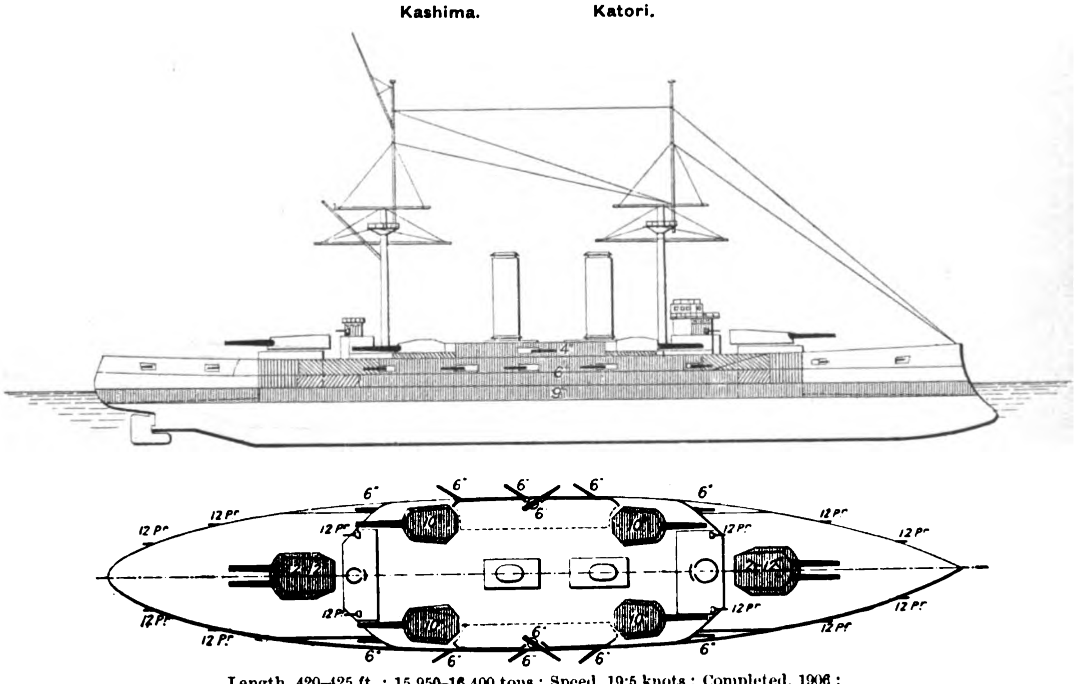
Satsuma.



Length, 482 ft. ; 19,350 tons ; Speed, 20·5 knots ; Completed, 1909 ;
Armament, 4—12 in., 12—10 in., 12—4·7 in., 4—12 pr. 4 small.

See page 259.

Kashima. Katori.



Length, 420–425 ft. ; 15,950–16,400 tons ; Speed, 19·5 knots ; Completed, 1906 ;
Armament, 4—12 in., 4—10 in., 12—6 in., 12—12 pr., 11 small.

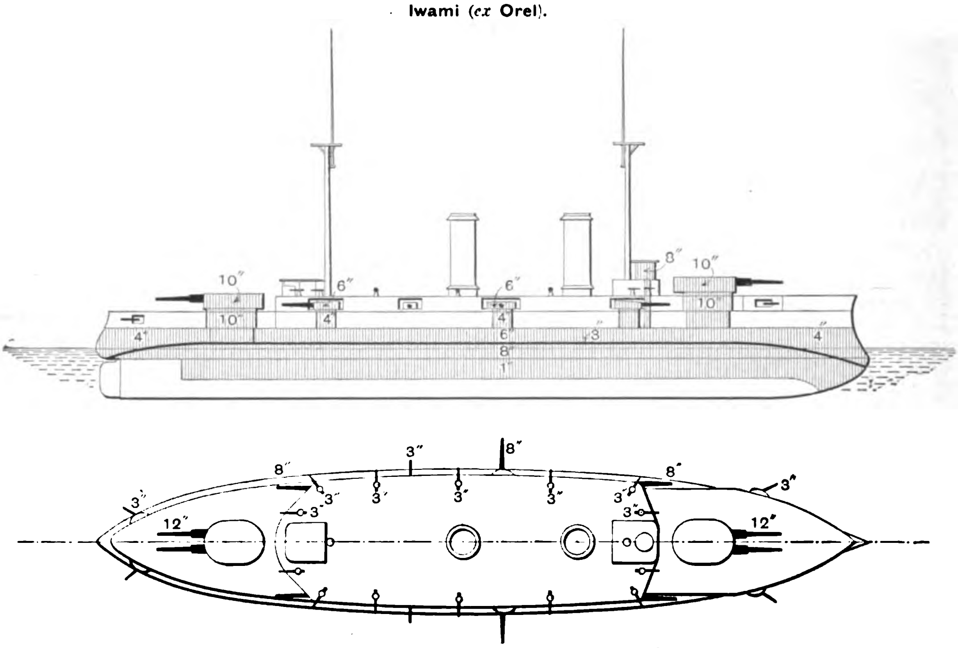
See page 258.

PLATE 51.

JAPAN.

BATTLESHIPS.

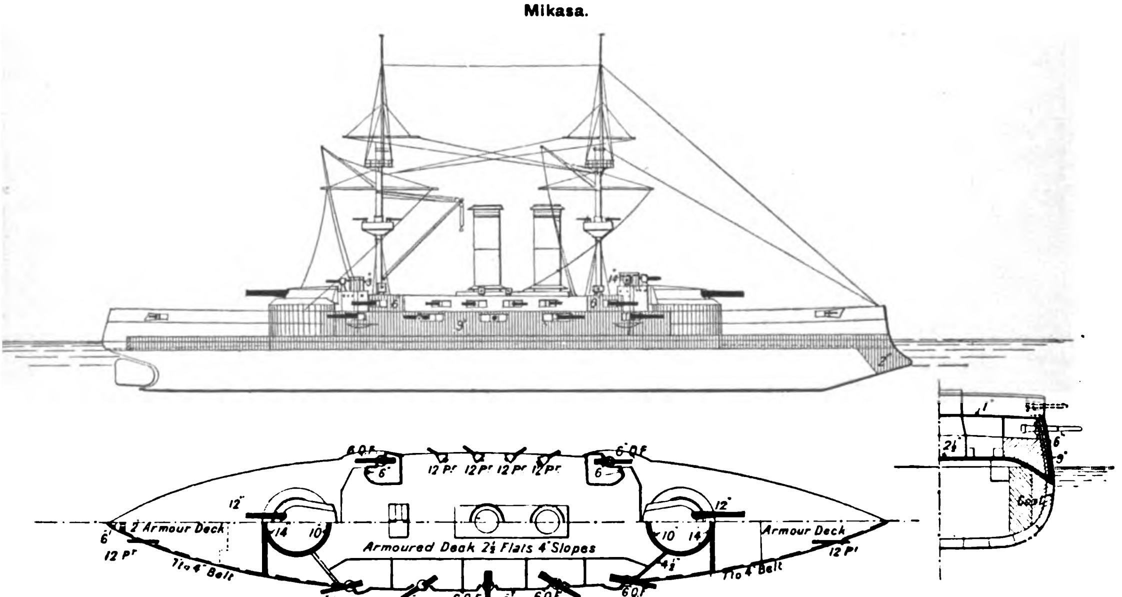
Iwami (*ex* Orel).



Length, 368 ft.; 13,516 tons; Speed, 18 knots; Completed, 1904;
Armament, 4—12 in., 6—8 in., 20—3 in., 26 small.

See page 258.

Mikasa.



Length, 400 ft.; 15,200 tons; Speed, 18·5 knots; Completed, 1902;
Armament, 4—12 in., 4—10 in., 10—6 in., 20—12 pr., 20 small.

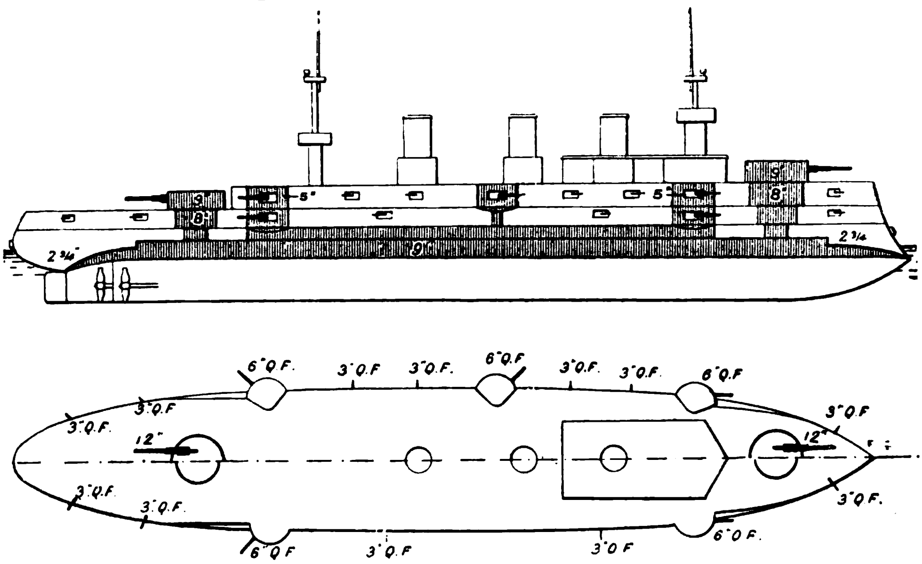
See page 258.

NOTE.—4—10 in. guns have been substituted for 4—6 in. on upper deck.

JAPAN.

BATTLESHIPS.

Sagami *late* **Peresviet.** **Suo** *late* **Pobieda.**

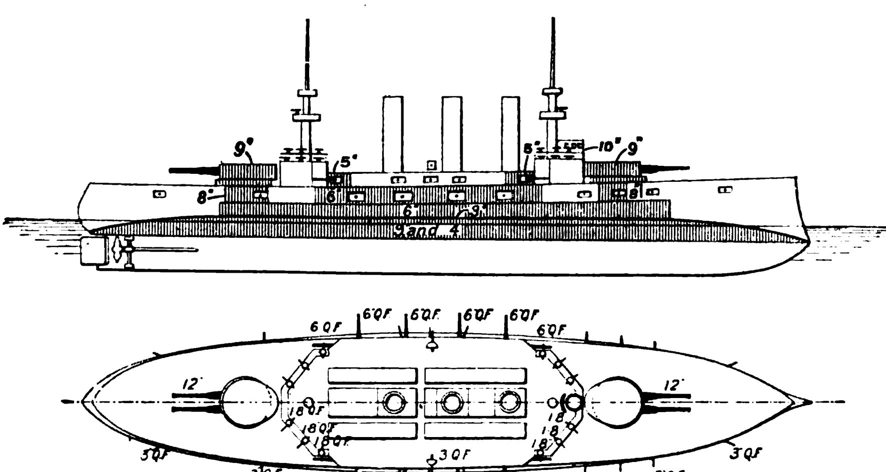


Note: In the "Pobieda" the Belt Extends the Full Length of the Ship.

Length, 401 ft.; 12,674 tons; Speed, 18 knots; Completed, 1901;
Armament, 4—12 in., 10—6 in., 16—12 pr., 27 small.

See page 259.

Hizen *late* **Retvizan.**



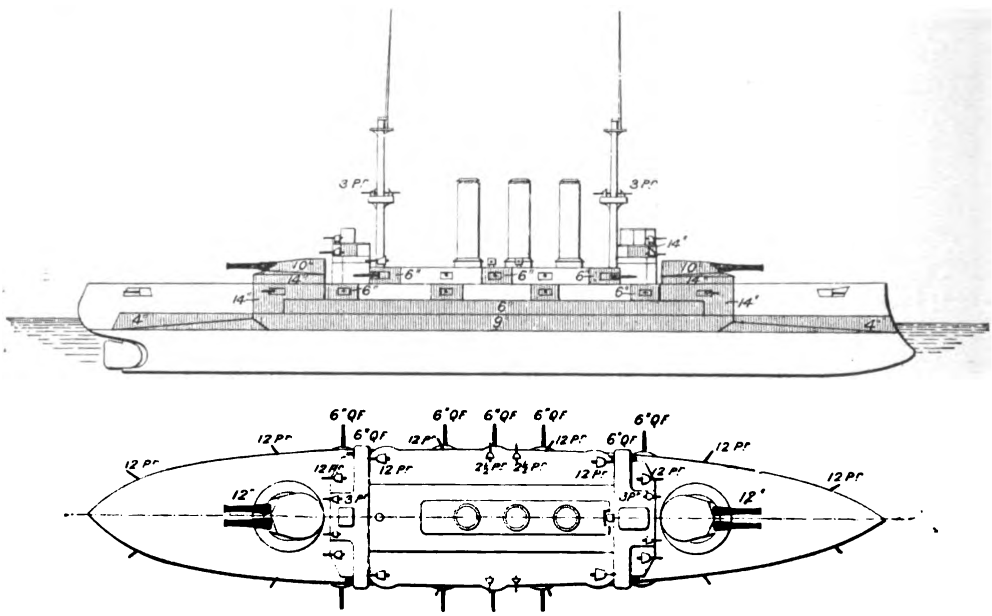
Length, 374 ft.; 12,700 tons; Speed, 18 knots; Completed, 1902;
Armament, 4—12 in., 12—6 in., 20—12 pr., 6 small.

See page 257.

JAPAN.

BATTLESHIPS.

Asahi. **Shikishima.**

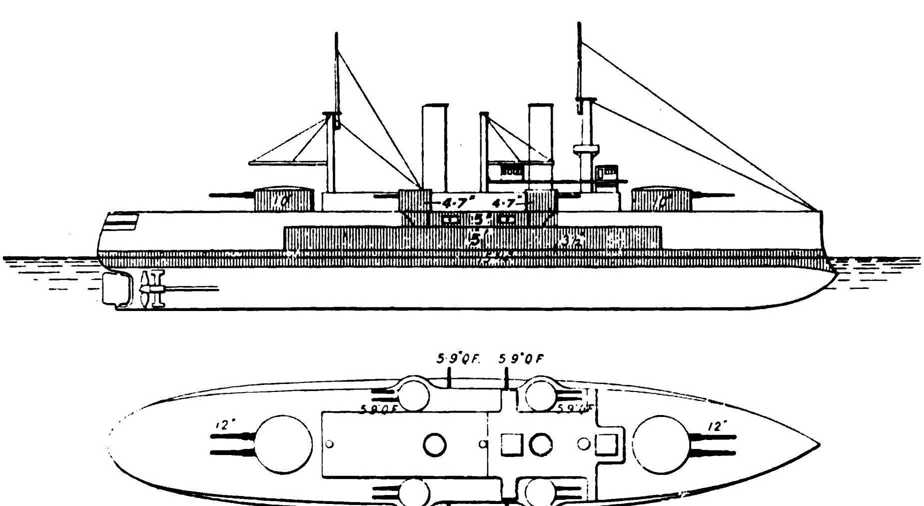


The "Asahi" has but two funnels.

Length, 400 ft.; 14,850 - 15,200 tons; Speed, 18—18·3 knots; Completed, 1899-1900;
Armament, 4—12 in., 14—6 in., 20—12 pr., 12 small.

See page 257.

Tango *late* **Poltava.**



Length, 367 ft.; 10,960 tons; Speed, 16 knots; Completed, 1898;
Armament, 4—12 in., 12—5·9 in., 14 small.

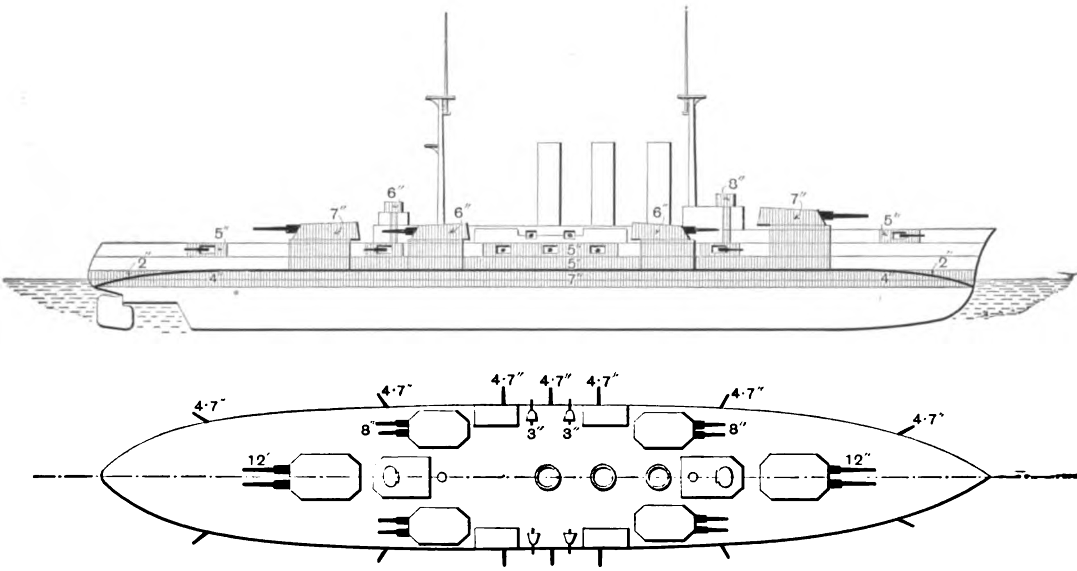
See page 259.

PLATE 54.

JAPAN.

ARMOURED CRUISERS.

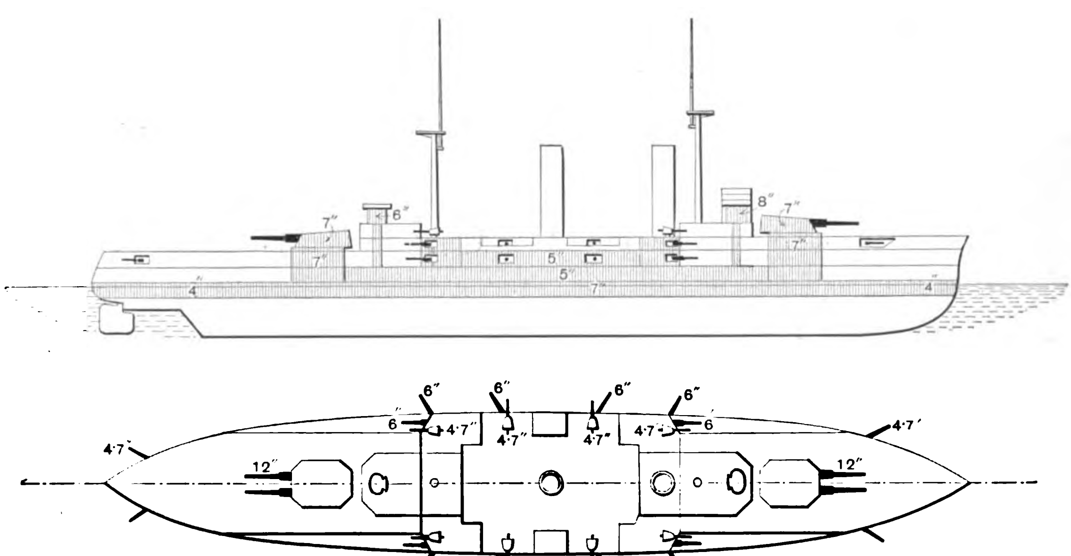
Ibuki. **Kurama.**



Length, 450 ft.; 14,620 tons; Speed, 22 knots; Completed, 1909-1911;
Armament, 4—12 in., 8—8 in., 14—4·7 in., 9 small.

See page 257.

Ikoma. **Tsukuba.**



Length, 440 ft.; 13,750 tons; Speed, 21 knots; Completed, 1907;
Armament, 4—12 in., 12—6 in., 12—4·7 in., 8 small.

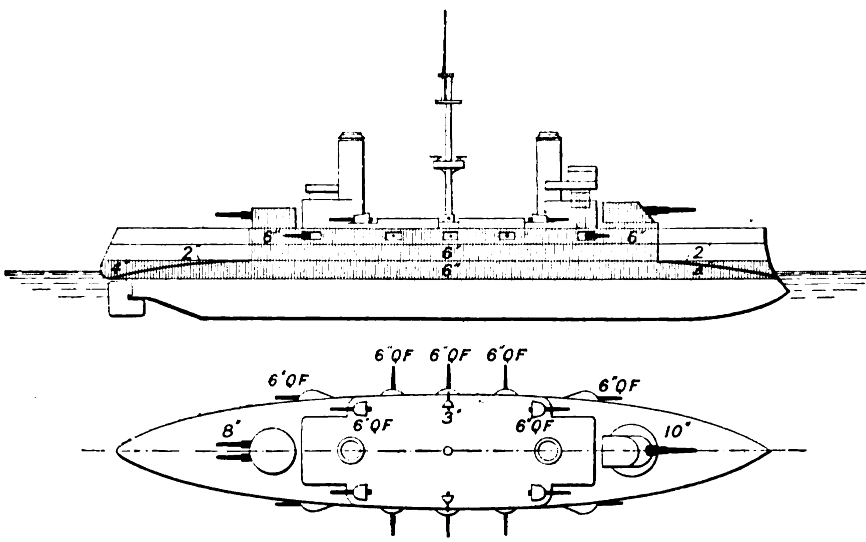
See page 257.

PLATE 55.

JAPAN.

ARMOURED CRUISERS.

Kasuga. **Nisshin.**

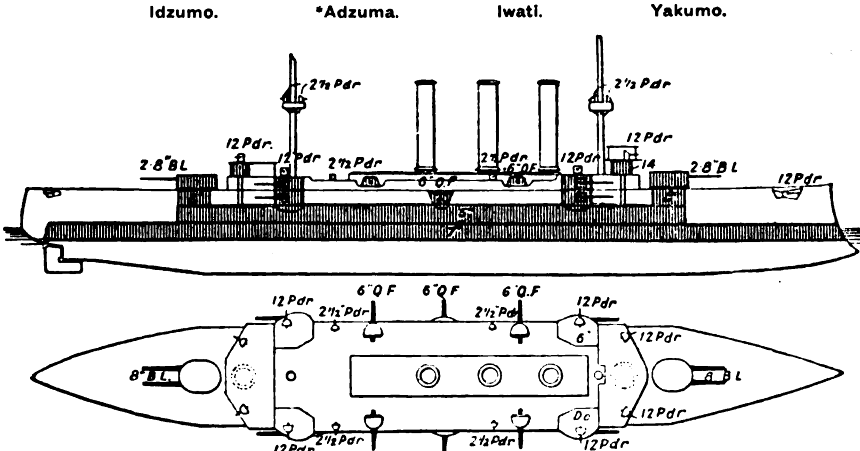


The Nisshin has 2-8 in. guns in fore barbette.

Length, 344 ft. ; 7269—7700 tons ; Speed, 20 knots ; Completed, 1904 ;
Armament, 1—10 in., 2—8 in., 14—6 in., 10—3 in., 8 small.

See page 258.

Idzumo. ***Adzuma.** **Iwati.** **Yakumo.**



Length, 400—431 ft. ; 9436--9850 tons ; Speed, 20—22 knots ; Completed, 1901 ;
Armament, 4—8 in., 14—6 in., 12—12 pr., 8 small.

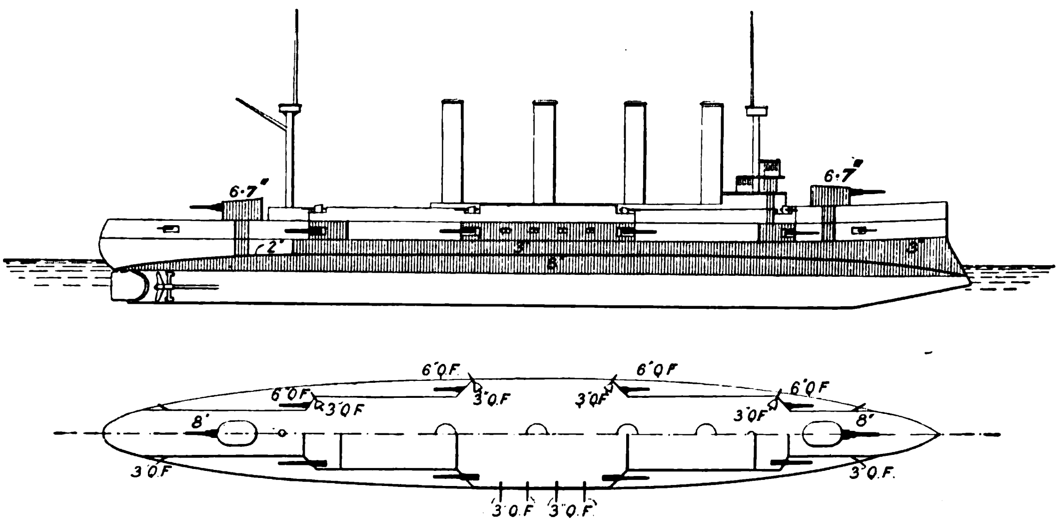
*12—6 in. guns.

See page 257.

JAPAN.

ARMOURED CRUISERS.

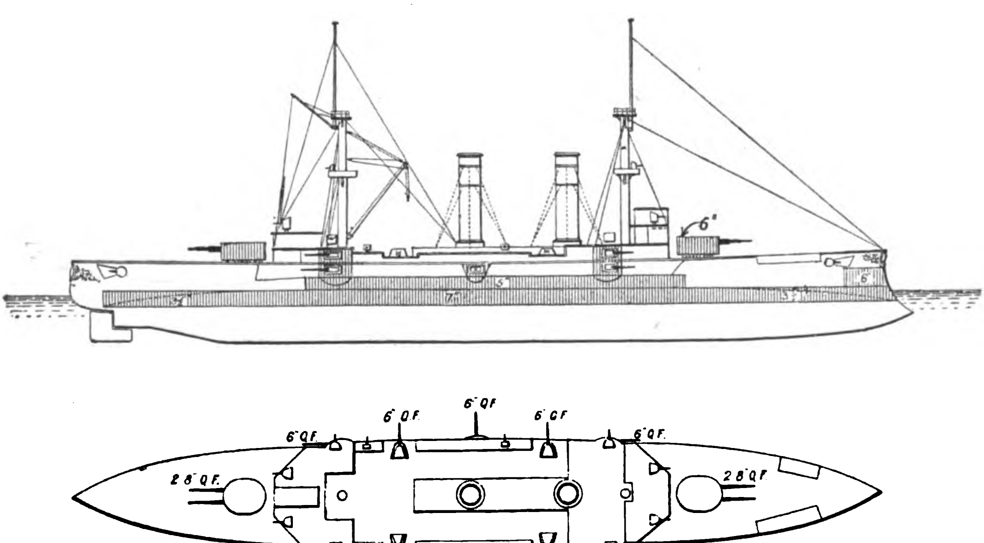
Aso *late* **Bayan.**



Length, 443 ft.; 7726 tons; Speed, 22 knots; Completed, 1902;
Armament, 2—8 in., 8—6 in., 32—3 in., 29 small.

See page 257.

Asama. **Tokiwa.**



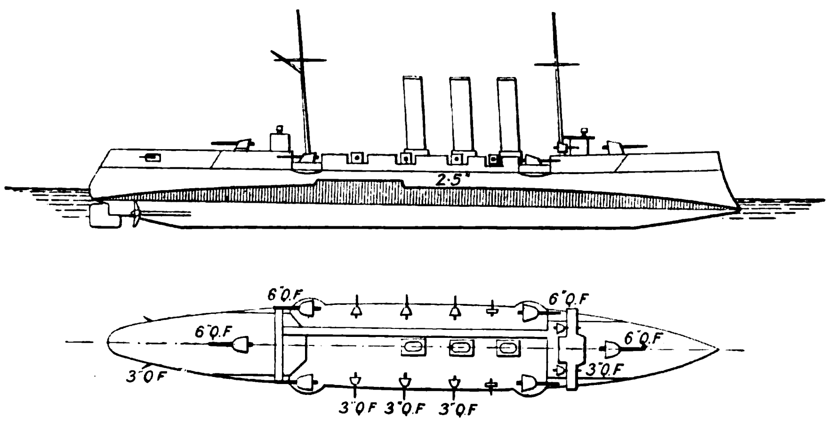
Length, 408 ft.; 9700 tons; Speed, 22·1—23 knots; Completed, 1899;
Armament, 4—8 in., 14—6 in., 12—12 pr., 8 small.

See page 257.

JAPAN.

CRUISERS.

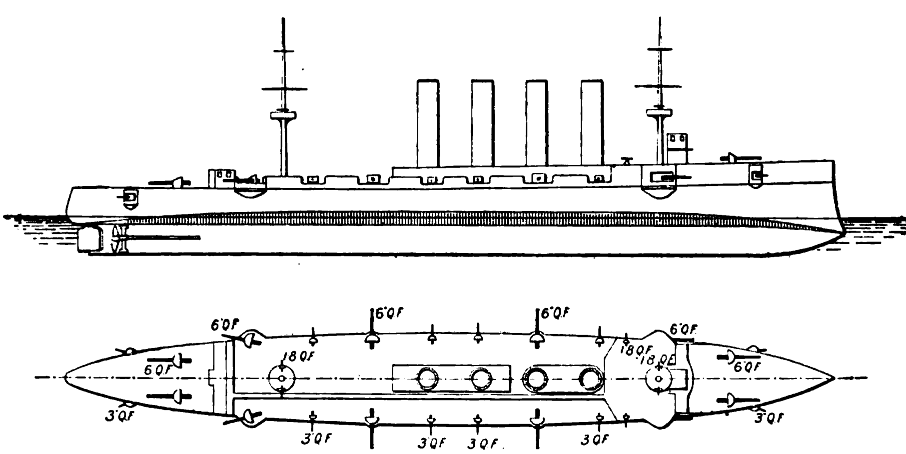
Niitaka. **Tsushima.**



Length, 235 ft.; 3365 tons; Speed, 20 knots; Completed, 1904–5;
Armament, 6—6 in., 10—3 in., 4 small.

See page 260.

Sōya *late* **Waryag.**



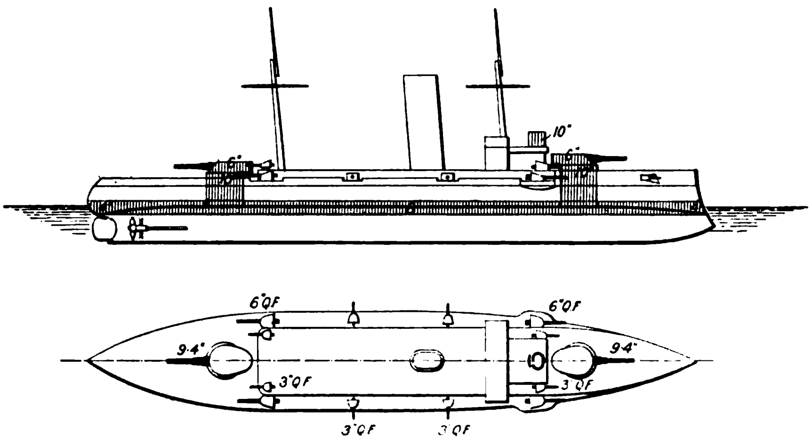
Length, 420 ft.; 6500 tons; Speed, 23 knots; Completed, 1900;
Armament, 12—6 in., 12—12 pr., 6 small.

See page 261.

NETHERLANDS.

COAST DEFENCE SHIPS.

De Ruyter. **Hertog Hendrik.** **Koningin Regentes.** **Marten Tromp.**



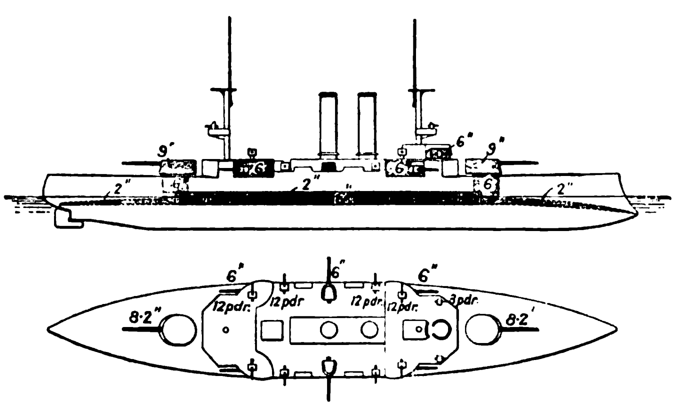
Length, 817 ft.; 5014—5211 tons; Speed, 16·5 knots; Completed, 1902—1906; Armament, 2—9·4 in., 4—6 in., 10—3 in., 4 small.

See page 262.

NORWAY.

COAST DEFENCE SHIPS.

Norge. **Eidsvoid.**



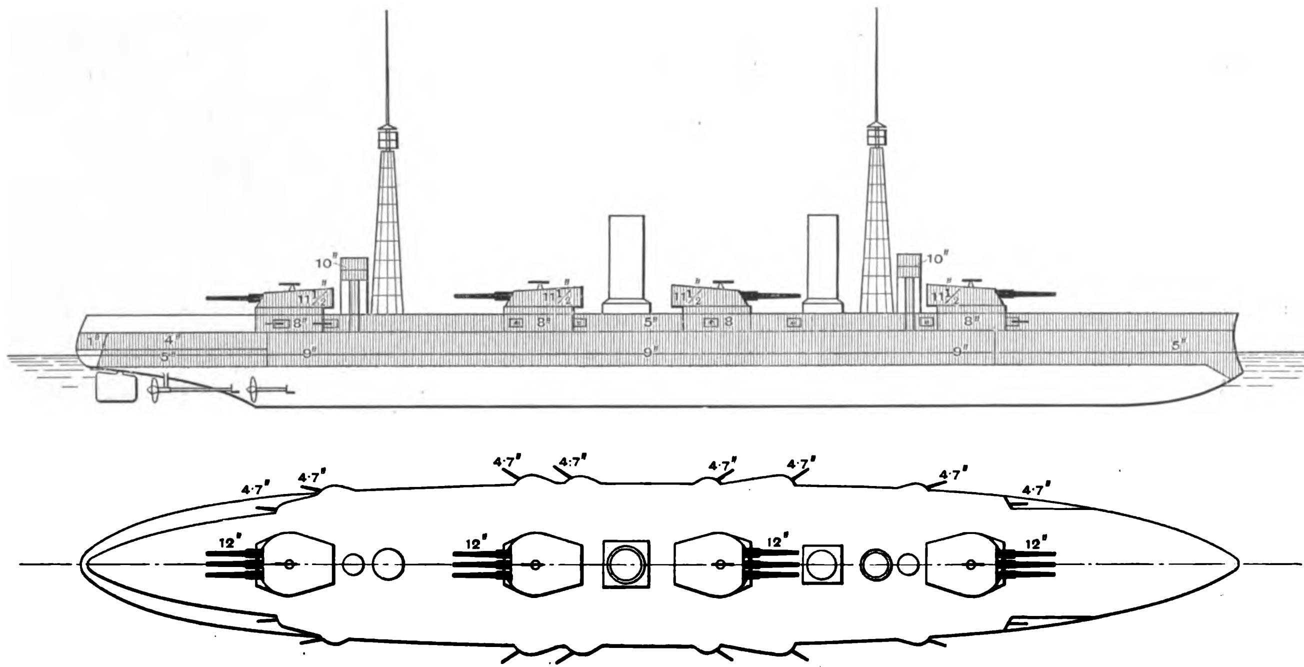
Length, 290 ft.; 3847 tons; Speed, 16·5 knots; Completed, 1901; Armament, 2—8·2 in., 6—6 in., 8—12 pr., 6 small.

See page 264.

RUSSIA.

BATTLESHIPS.

Gangut. **Petropavlovsk.** **Poltava.** **Sevastopol.**

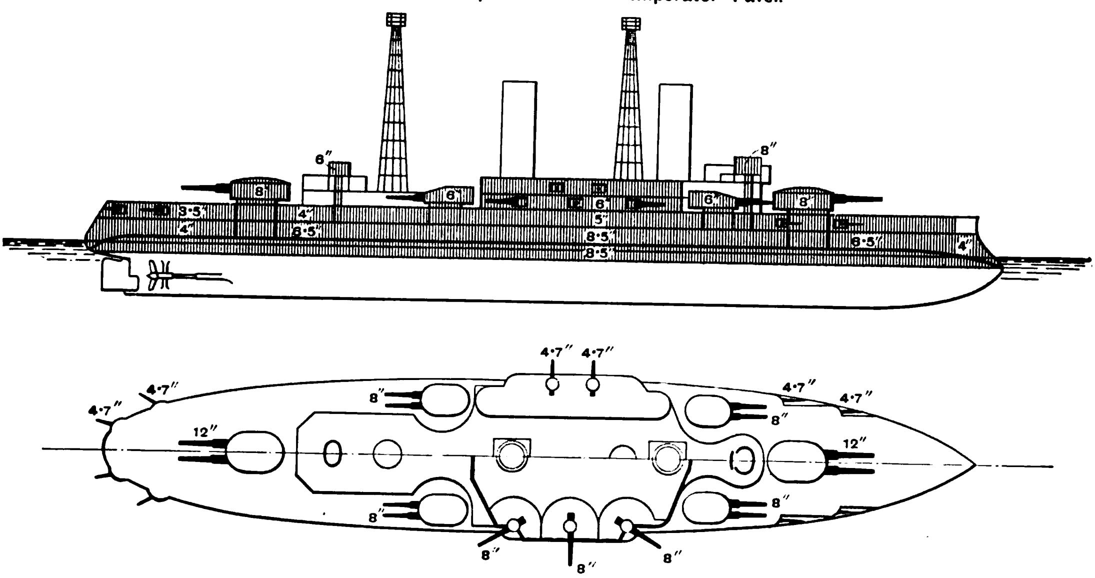


Length, 590 ft.; 23,000 tons; Speed, 23 knots; Building;
Armament, 12—12 in., 16—4·7 in., 4—3 pr.

See page 266.

BATTLESHIPS.

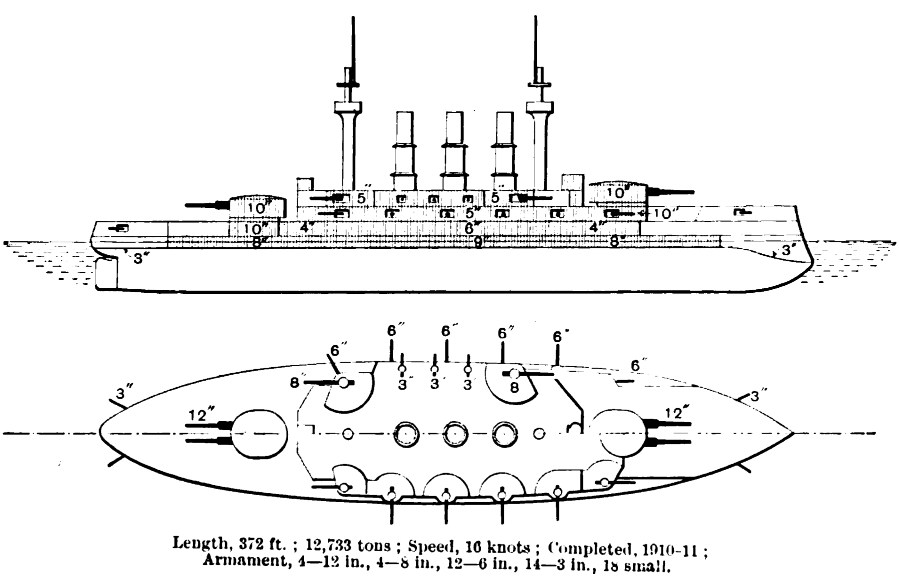
Andrei Pervozvannyi. **Imperator Pavel.**



Length, 430 ft. ; 17,200 tons ; Speed, 18 knots ; Completed, 1910 ;
Armament, 4—12 in., 14—8 in., 20—4·7 in.

See page 266.

Evstafi. **Ioann Zlatoust.**



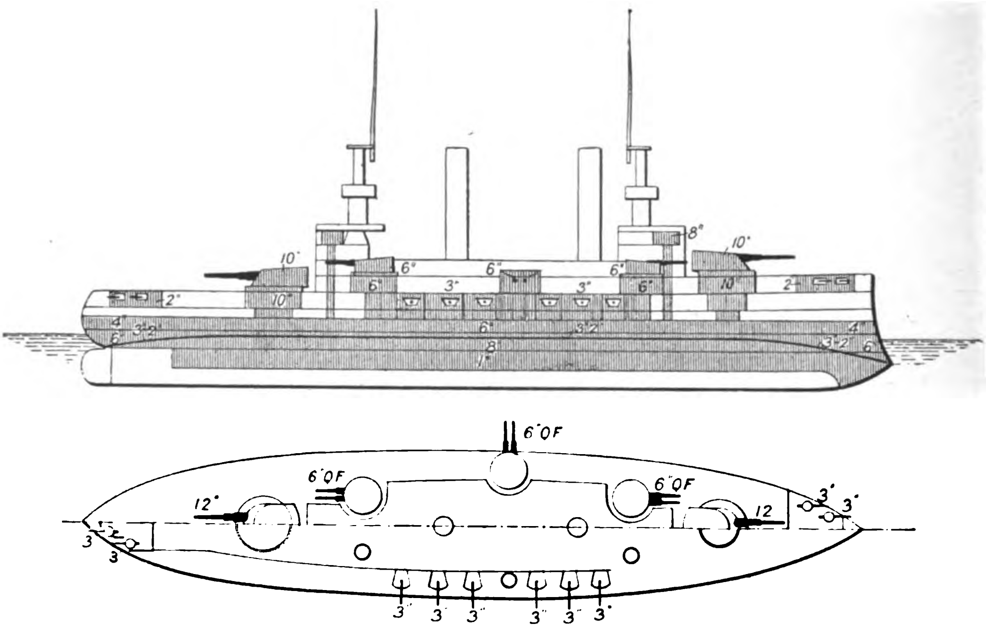
Length, 372 ft. ; 12,733 tons ; Speed, 16 knots ; Completed, 1910-11 ;
Armament, 4—12 in., 4—8 in., 12—6 in., 14—3 in., 18 small.

See page 266.

RUSSIA.

BATTLESHIPS.

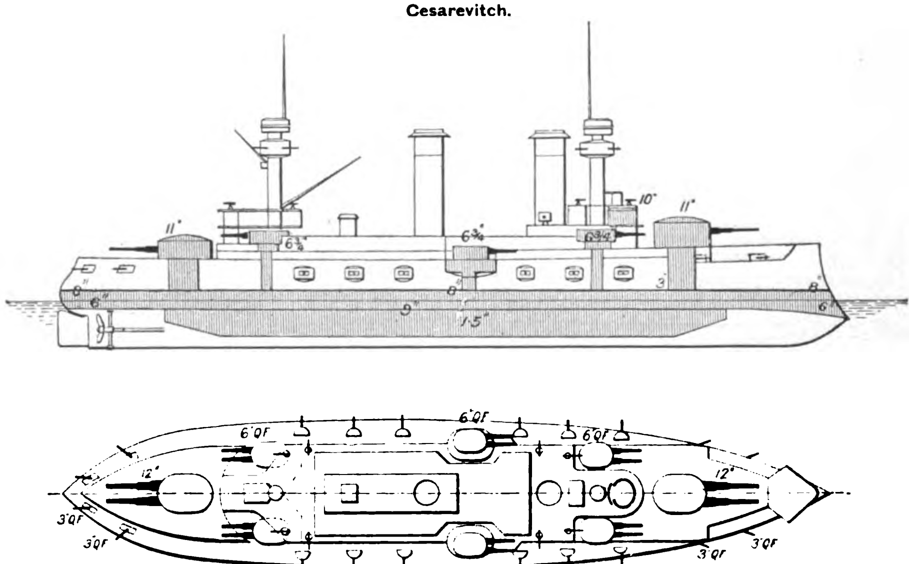
Slava.



Length, 367 ft.; 13,516 tons; Speed, 18 knots; Completed, 1906;
Armament, 4—12 in., 12—6 in., 20—3 in., 26 small.

See page 267.

Cesarevitch.



Length, 389 ft.; 12,912 tons; Speed, 19·6 knots; Completed, 1902;
Armament, 4—12 in., 12—6 in., 20—3 in., 32 small.

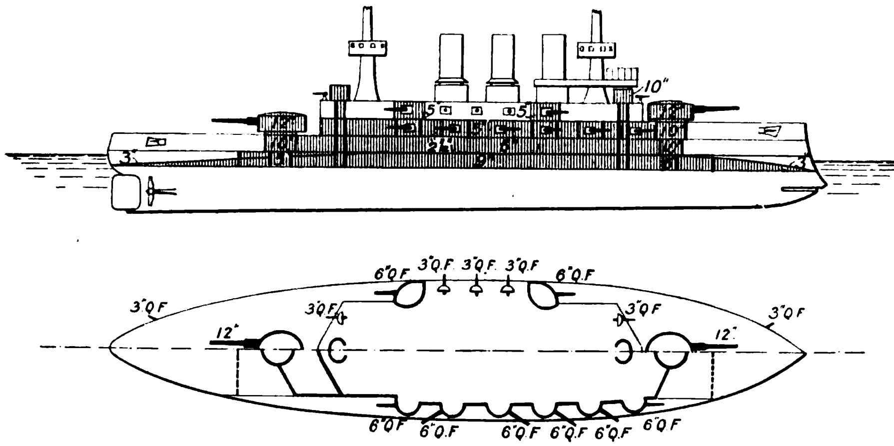
See page 266.

PLATE 62.

RUSSIA.

BATTLESHIPS.

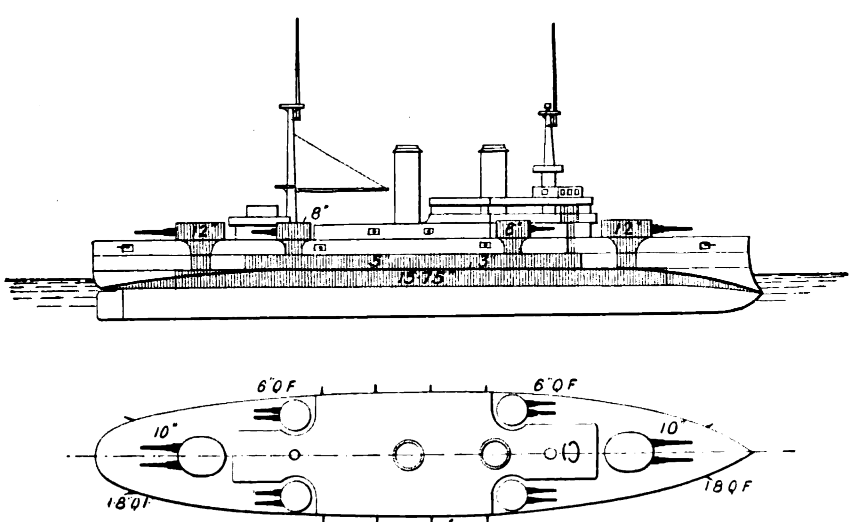
Panteleimon, *ex* Kniaz Potemkine Tavritchesky.



Length, 372 ft. ; 12,480 tons ; Speed, 17 knots ; Completed, 1902 ;
Armament, 4—12 in., 16—6 in., 14—3 in., 28 small.

See page 267.

Rostislav.



Length, 341 ft. ; 8880 tons ; Speed, 16 knots ; Completed, 1899 ;
Armament, 4—10 in., 8—6 in., 18 small.

See page 267.

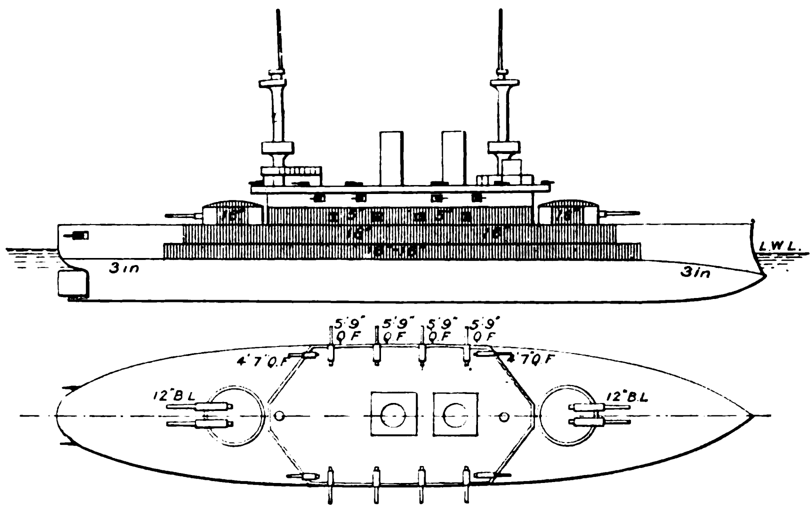
PLATE 63.

f

RUSSIA.

BATTLESHIPS.

Tria Sviatitelia.

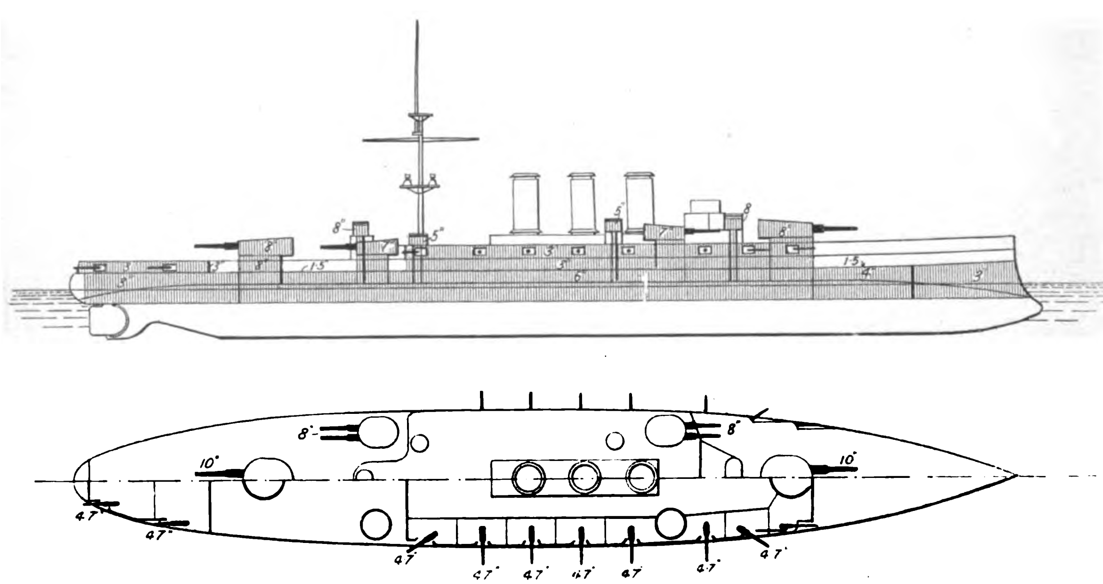


Length, 357 ft. ; 13,318 tons ; Speed, 18 knots ; Completed, 1896 ;
Armament, 4—12 in., 8—5·9 in., 4—4·7 in., 50 small.

See page 267.

ARMOURED CRUISERS.

Rurik.



Length, 490 ft. ; 15,170 tons ; Speed, 21 knots ; Completed, 1907 ;
Armament, 4—10 in., 8—8 in., 20—4·7 in., 12 small.

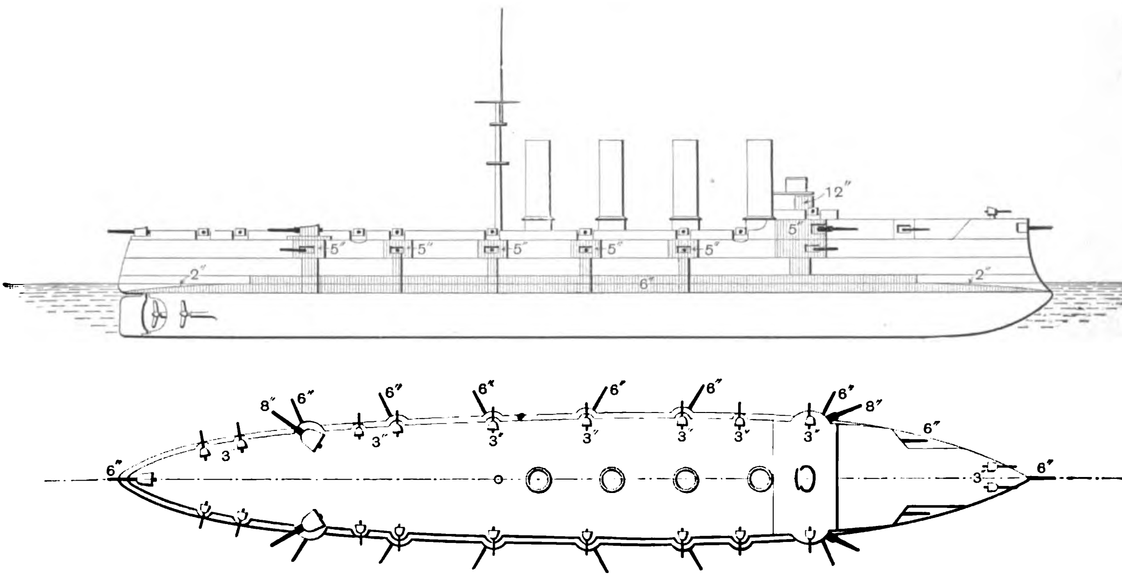
See page 267.

PLATE 64.

RUSSIA.

ARMOURED CRUISERS.

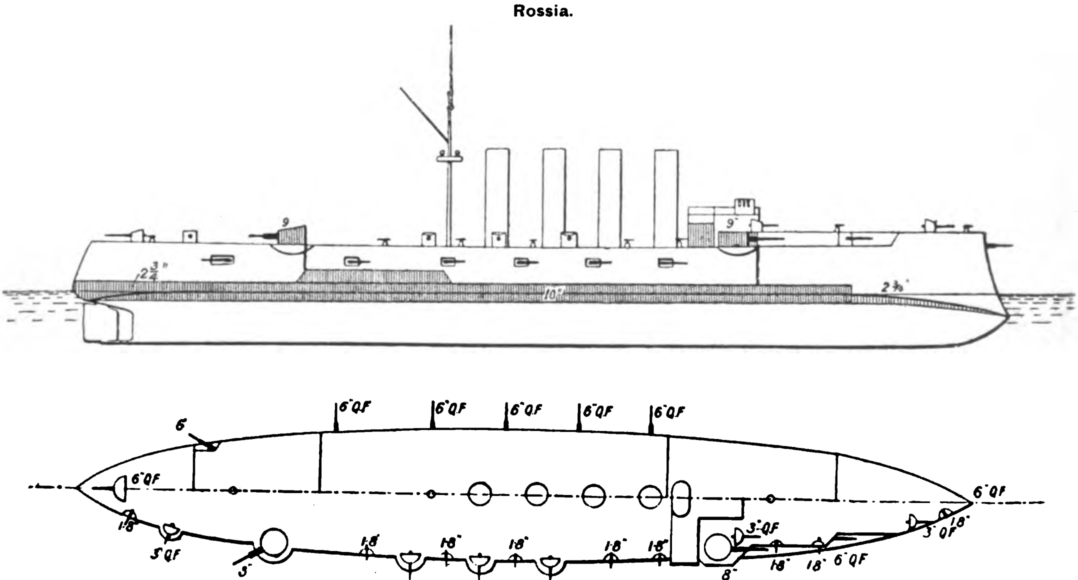
Gromoboi.



Length, 473 ft. ; 12,336 tons ; Speed, 20 knots ; Completed, 1900 ; Armament, 4—8 in., 16—6 in., 20—3 in., 20 small.

See page 266.

Rossia.



Length, 480 ft. ; 12,130 tons ; Speed, 20 knots ; Completed, 1898 ; Armament, 4—8 in., 16—6 in., 12—3 in., 20 small.

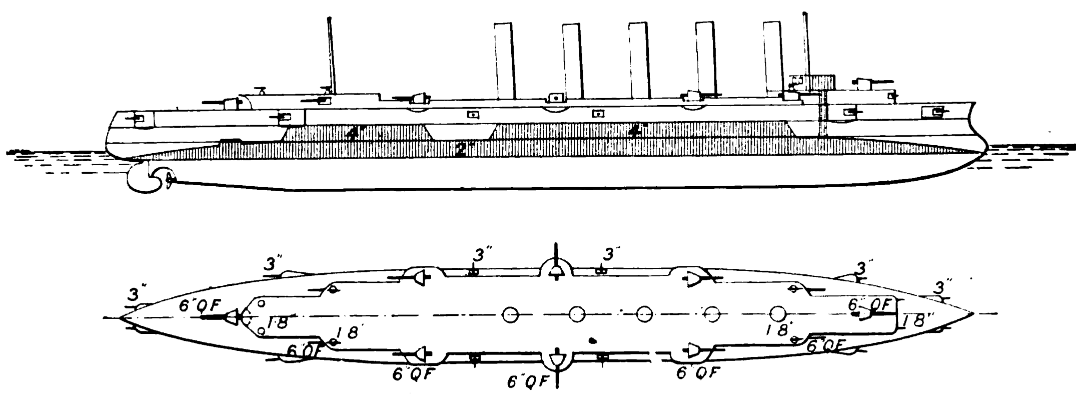
See page 267.

PLATE 65.

f 2

CRUISERS.

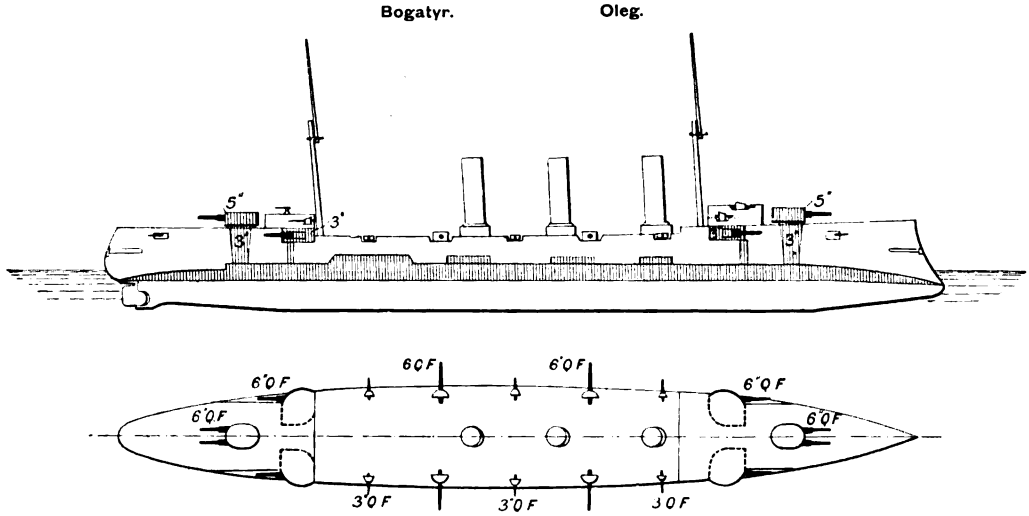
Askold.



Length, 426 ft. ; 5905 tons ; Speed, 23·8 knots ; Completed, 1901 ;
Armament, 12—6 in., 12—3 in., 12 small.

See page 268.

Bogatyr. Oleg.



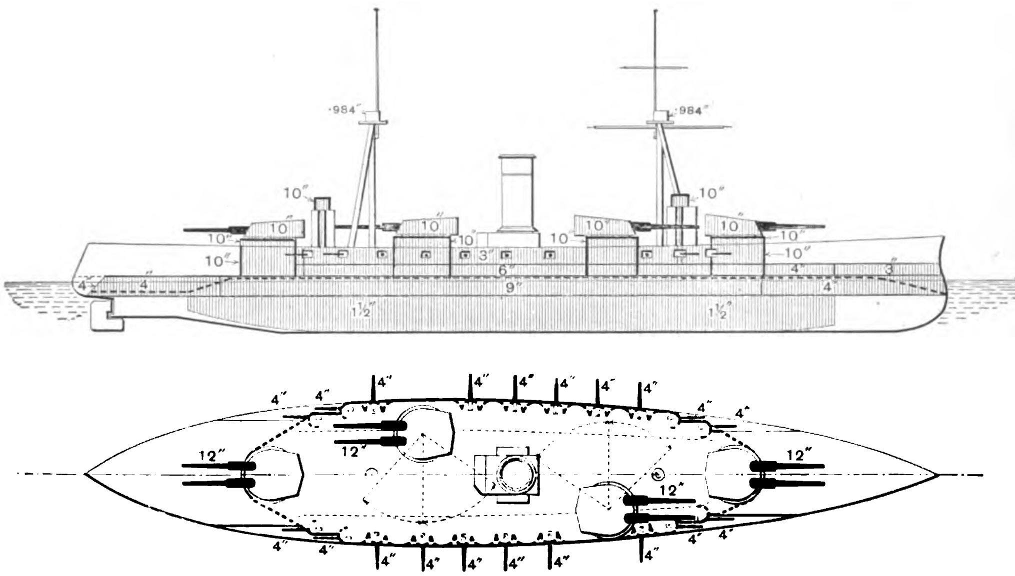
Length, 417-440 ft.; 6645-6675 tons ; Speed, 23-24 knots ; Completed, 1902-1904 ;
Armament, 12—6 in., 12—3 in., 10 small.

See page 268.

SPAIN.

BATTLESHIPS.

Alphonso XIII. España. Jaime I.

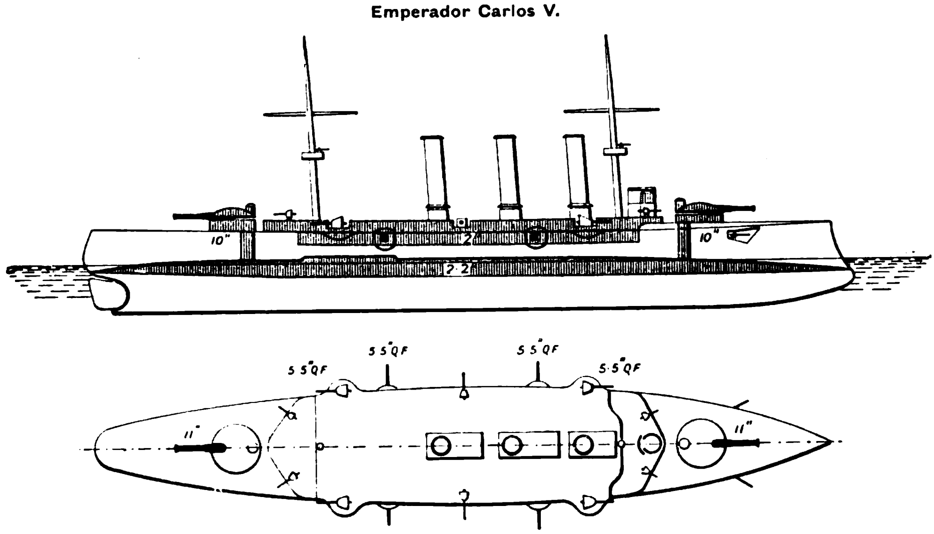


Length, 435 ft. ; 15,460 tons ; Speed, 19·5 knots ; Building ;
Armament, 8—12 in., 20—4 in., 6 small.

See page 270.

ARMOURED CRUISER.

Emperador Carlos V.



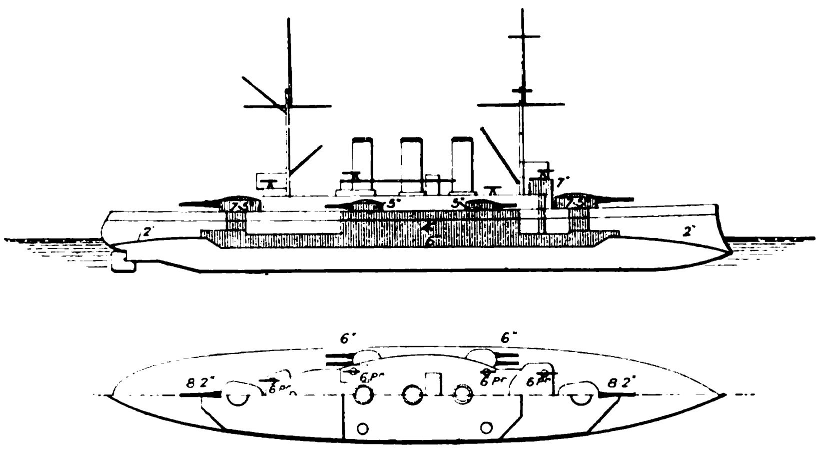
Length, 380 ft. ; 9089 tons ; Speed, 20 knots ; Completed, 1898 ;
Armament, 2—11 in., 8—5·5 in., 4—3·9 in., 12 small.

See page 270.

SWEDEN.

BATTLESHIP.

Oscar II.

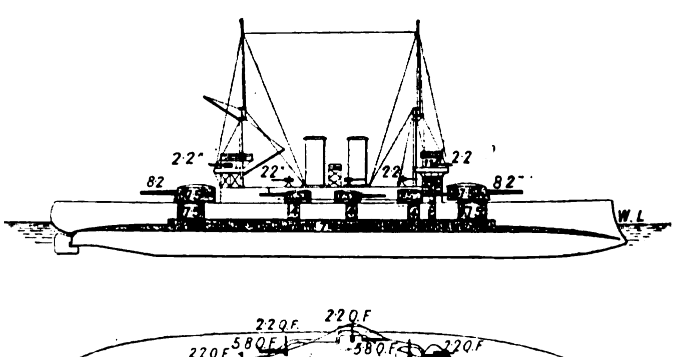


Length, 314 ft.; 4203 tons; Speed, 18 knots; Completed, 1907;
Armament, 2—8·2 in., 8—6 in., 14 small.

See page 272.

COAST DEFENCE SHIPS.

Aeran. **Manligheten.** **Tapperheten.** **Wasa.**



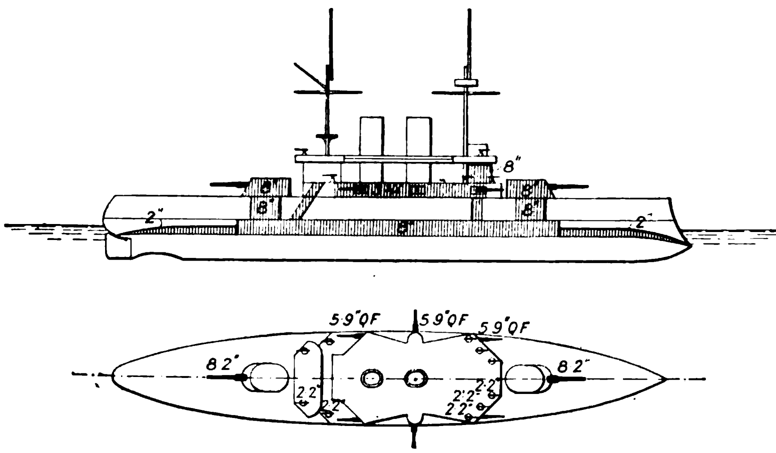
Length, 287 ft.; 3612 tons · Speed, 16·5-17·2 knots; Completed, 1901-1908;
Armament 2—8·2 in., 6—5·8 in., 14 small.

See page 272

SWEDEN.

COAST DEFENCE SHIP.

Dristigheten.

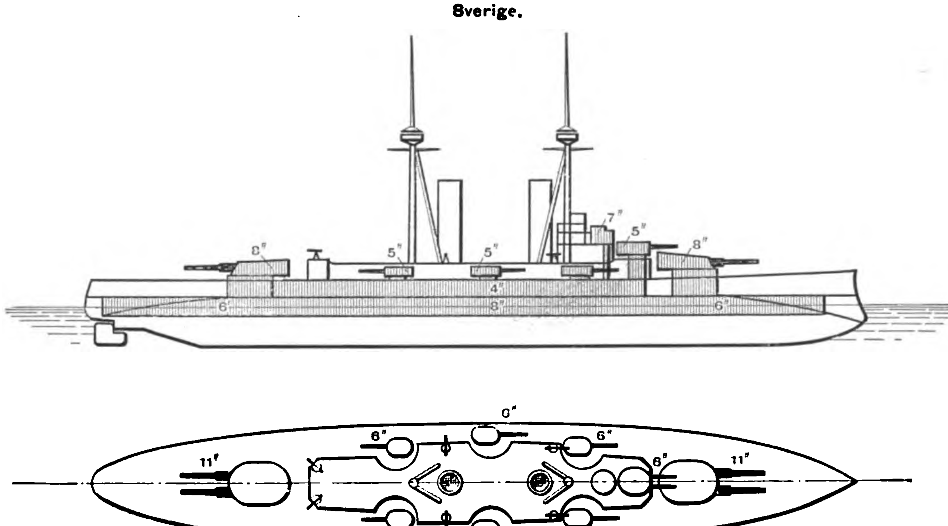


Length, 285 ft. ; 3445 tons ; Speed, 16·5 knots ; Completed, 1901 ;
Armament, 2—8·2 in., 6—5·9 in., 12 small.

See page 272.

ARMOURED CRUISER.

Sverige.



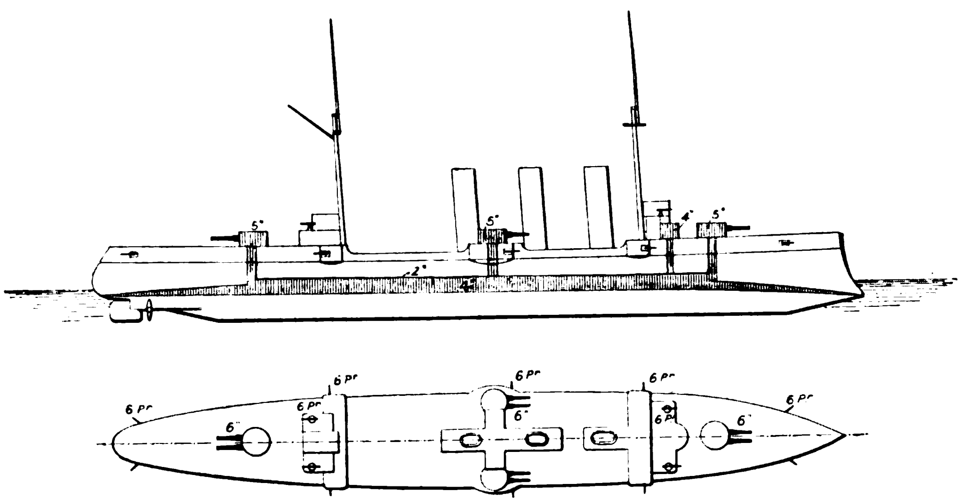
Length, 390 ft. ; 7,100 tons ; Speed, 22 knots ; Building ;
Armament, 4·11 in. ; 8—6 in. ; 6—12 pr.

See page 272.

SWEDEN.

ARMOURED CRUISER.

Fylgia.



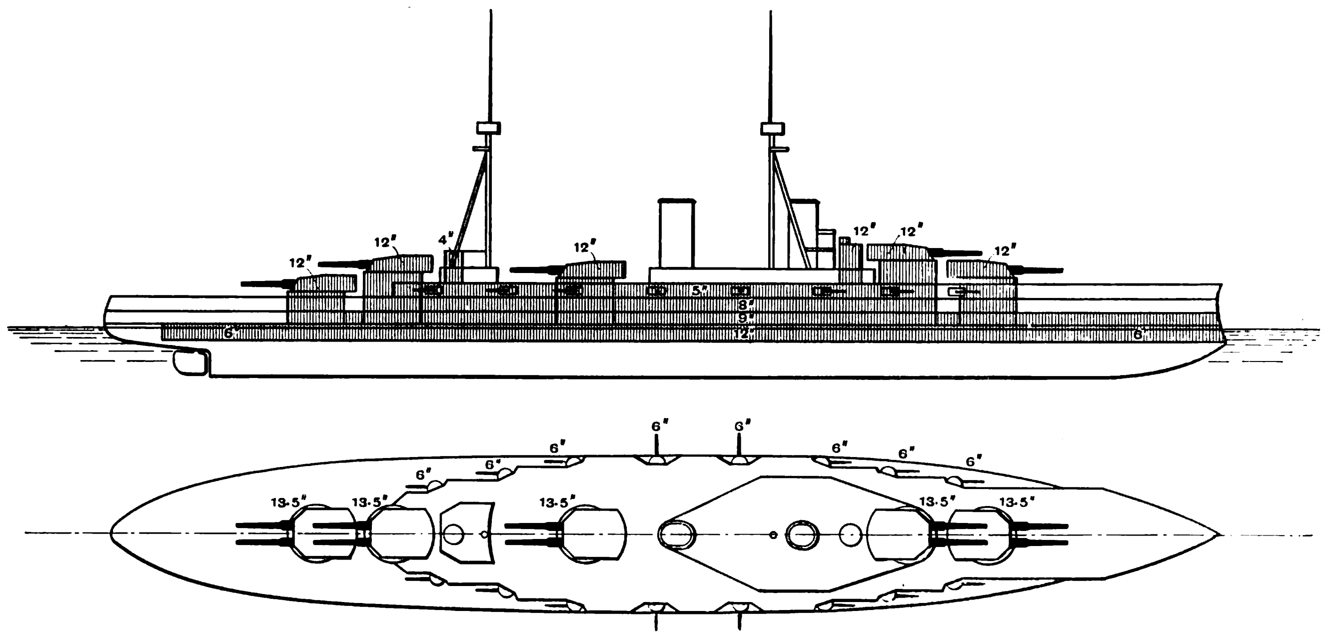
Length, 377 ft. ; 4100 tons ; Speed, 22·5 knots ; Completed, 1907 ;
Armament, 8—6 in., 17 small.

See page 272.

TURKEY.

BATTLESHIPS.

Reschad-i-Hamiss. **Reschad V.**



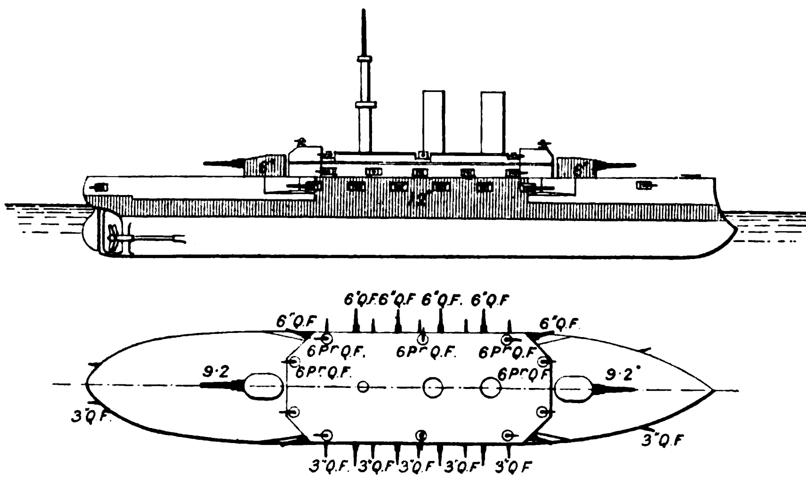
Length, 525 ft. ; 23,000 tons ; Speed, 21 knots ; Building ;
Armament, 10—13·5 in., 16—6 in.

See page 274.

TURKEY.

BATTLESHIP.

Messoudieh.

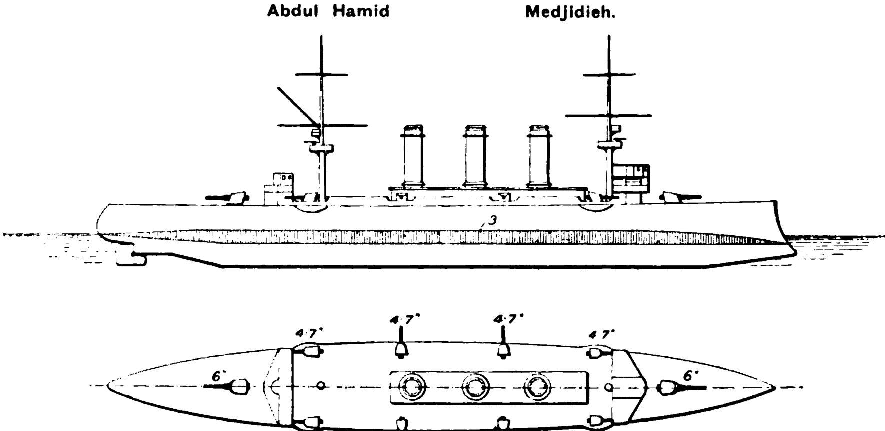


Length, 331 ft. ; 9120 tons ; Speed, 17·5 knots ; Completed, 1901 ;
Armament, 2—9·2 in., 12—6 in., 14—3 in., 14 small.

See page 274.

CRUISERS.

Abdul Hamid **Medjidieh.**



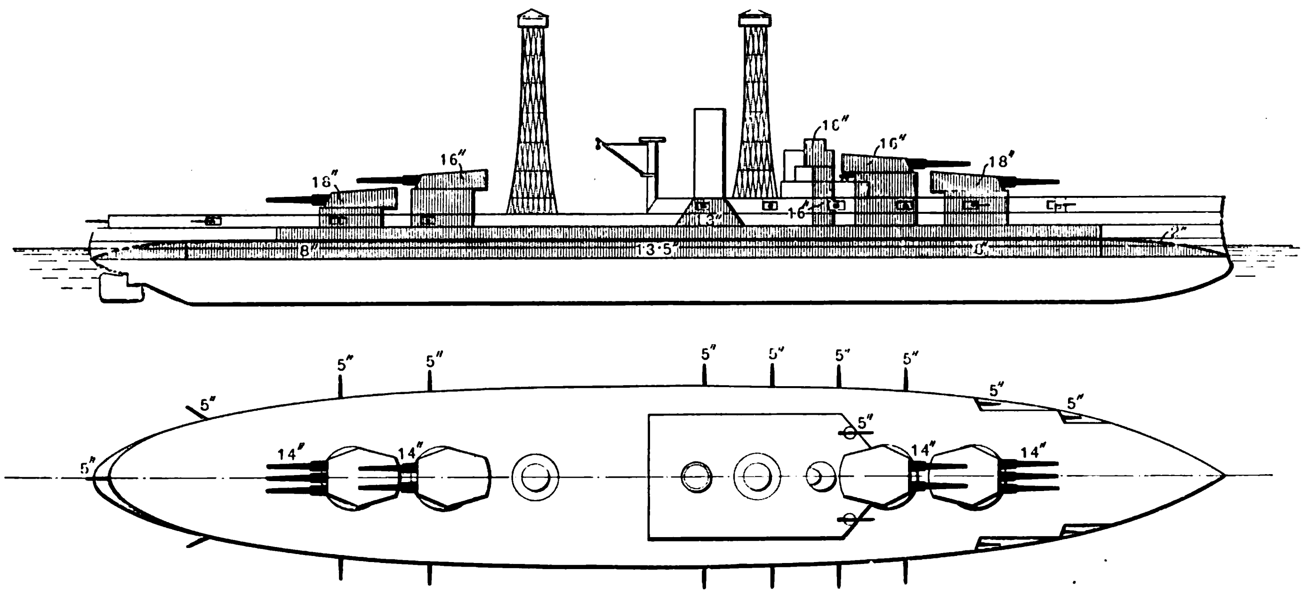
Length, 331—340 ft. ; 3432—3800 tons ; Speed, 22·2 knots ; Completed, 1904 ;
Armament, 2—6 in., 8—4·7 in., 12 small.

See page 274.

UNITED STATES.

BATTLESHIPS.

Nevada. **Oklahoma.**



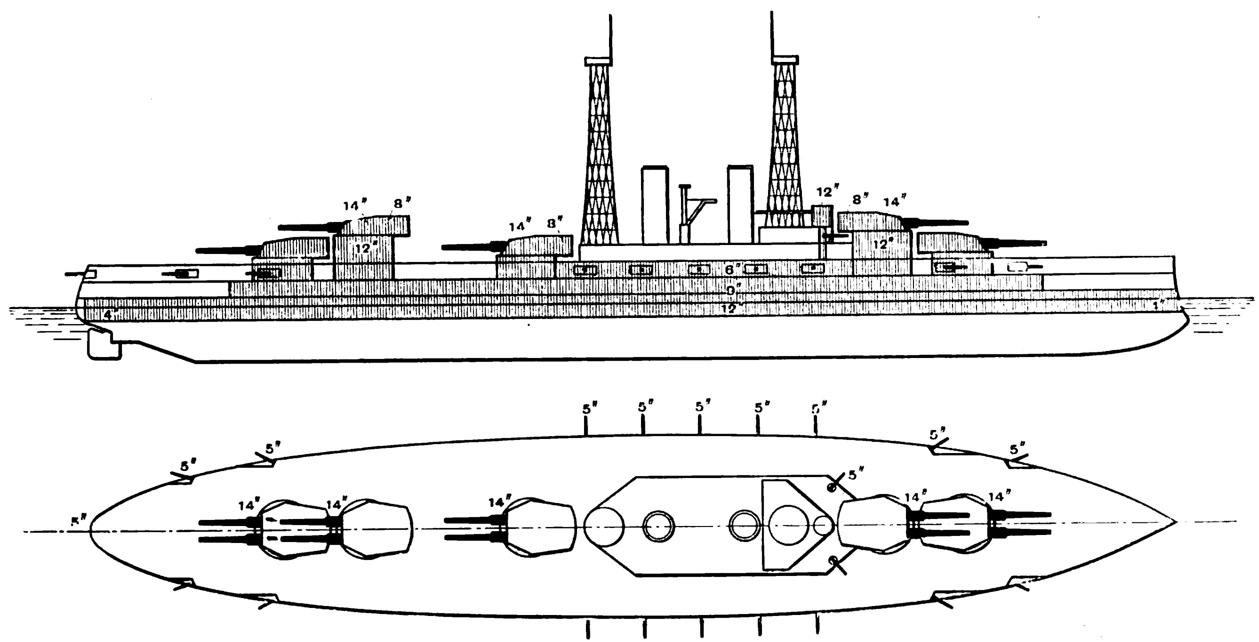
Length, 575 ft.; 27,000 tons; Speed, 20 knots; Building;
Armament. 10—14 in.; 21—5 in.; 4—smaller.

See page 277.

UNITED STATES.

BATTLESHIPS.

New York. **Texas.**



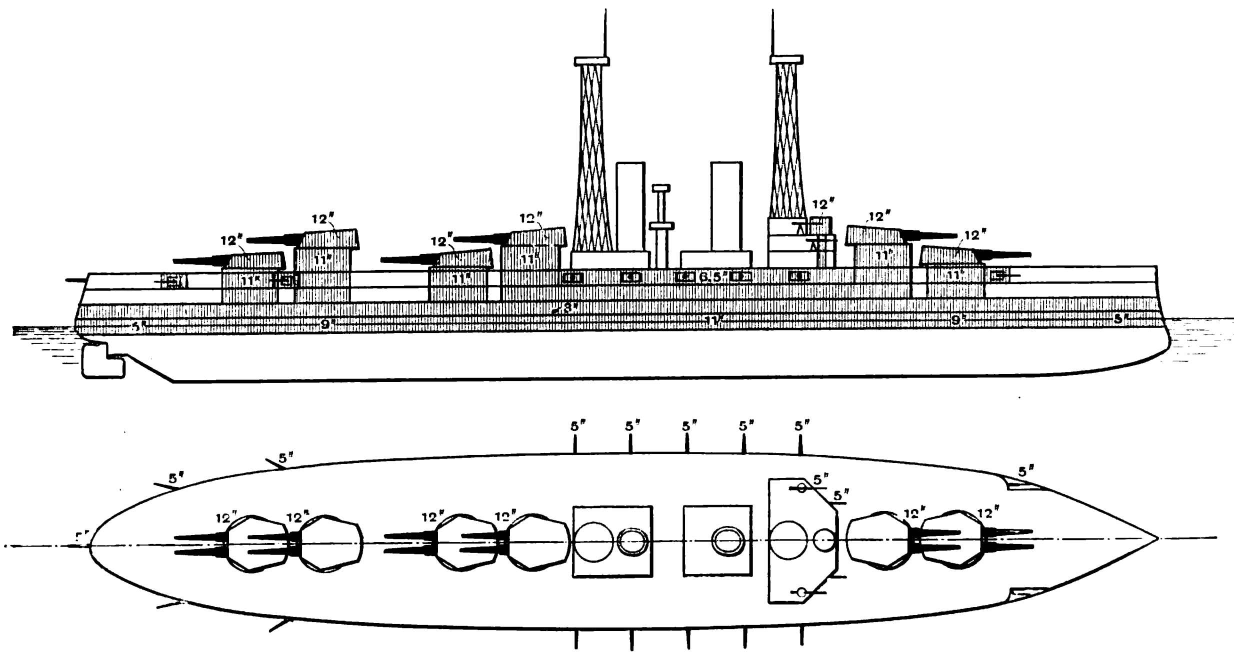
Length, 573 ft. ; 27,000 tons ; Speed, 21 knots ; Building ;
Armament, 10—14 in., 22—5 in.

See page 277.

UNITED STATES.

BATTLESHIPS.

Arkansas. **Wyoming.**

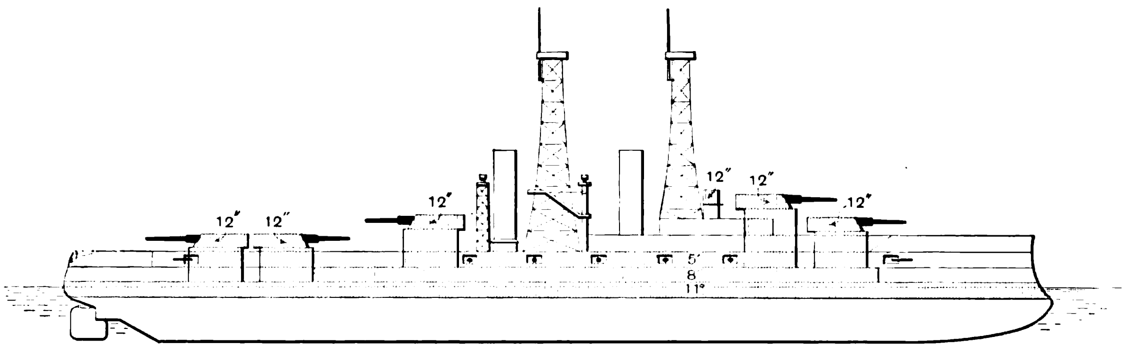


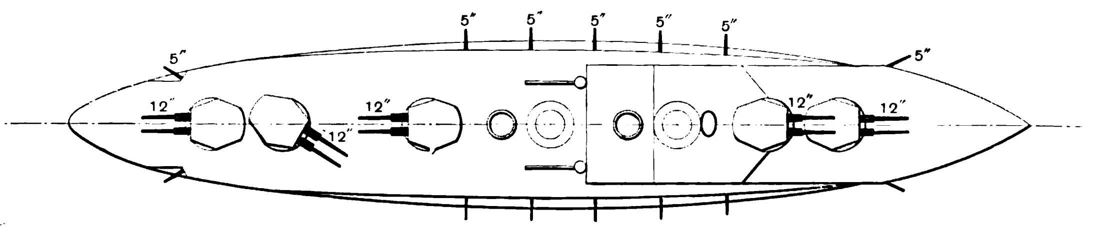
Length, 554 ft. ; 26,000 tons ; Speed, 20·5 knots ; Completed, 1912 ;
Armament, 12—12 in., 21—5 in., 4—3 pr.

See page 275.

BATTLESHIPS.

Delaware. **North Dakota.** **Florida.** **Utah.**



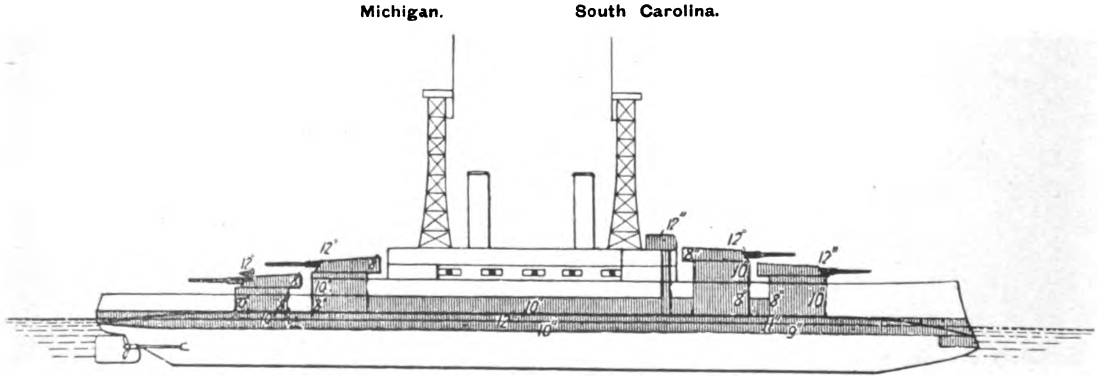


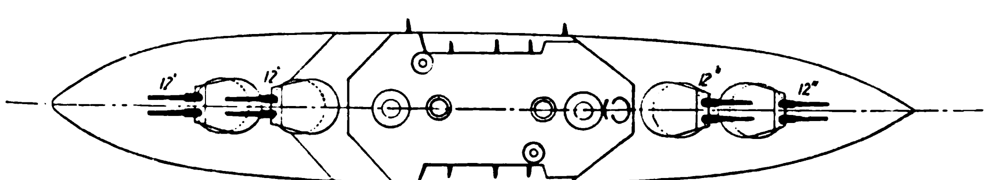
Delaware / **North Dakota** } Length, 510 ft. ; 20,000 tons ; Speed, 21·5 knots ; Completed, 1910 ; Armament, 10—12 in., 14—5 in., 16 small.

Florida / **Utah** } Length, 510 ft. ; 21,825 tons ; Speed, 21 knots ; Completed, 1911 ; Armament, 10—12 in., 16—5 in., 10 small.

See page 275.

Michigan. **South Carolina.**





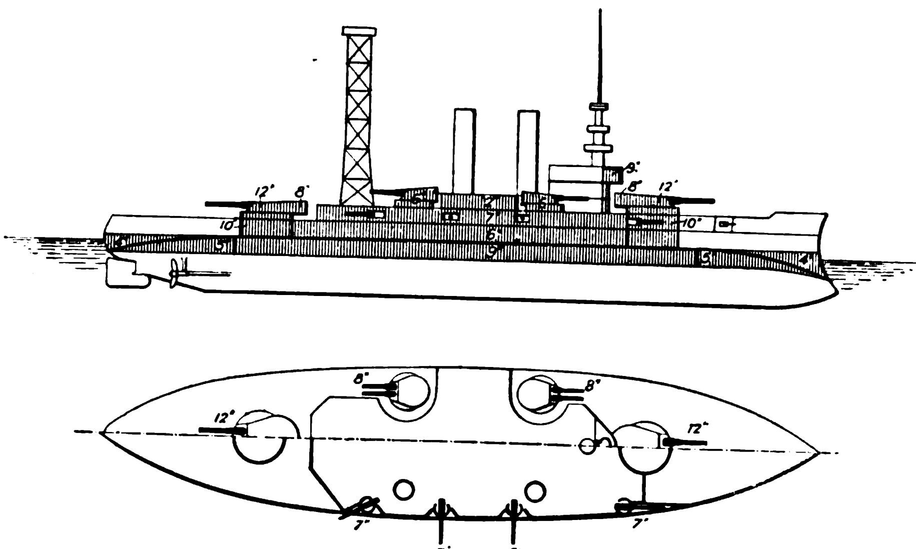
Length, 450 ft. ; 16,000 tons ; Speed, 18·5 knots ; Completed, 1909 ; Armament, 8—12 in., 22—3 in., 16 small.

See page 276.

UNITED STATES.

BATTLESHIPS.

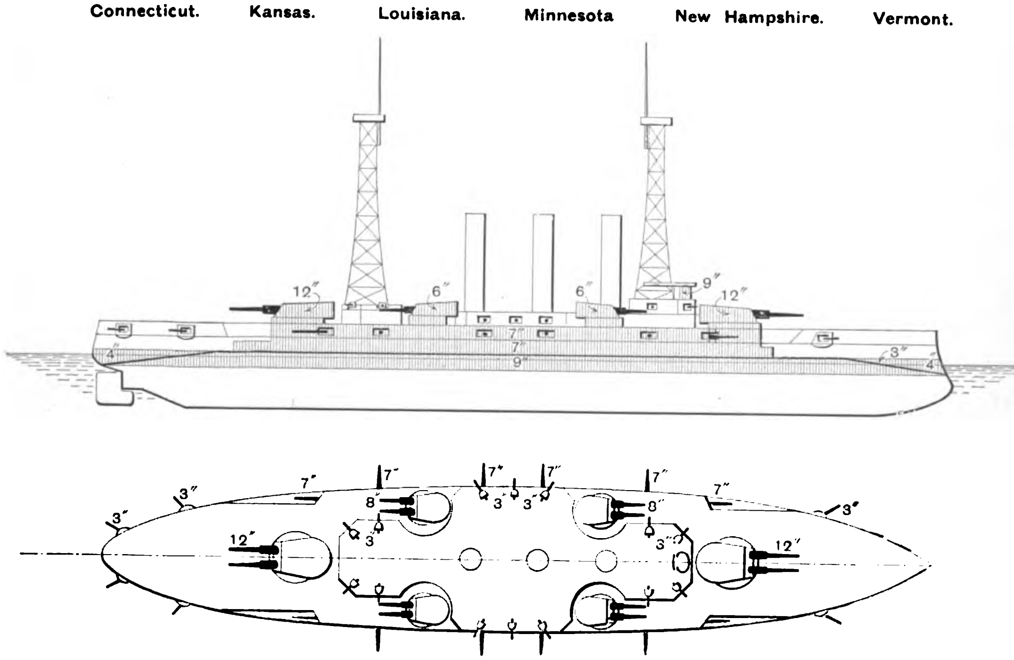
Idaho. **Mississippi.**



Length, 375 ft. ; 13,000 tons ; Speed, 17 knots ; Completed, 1909 ;
Armament, 4—12 in., 8—8 in., 8—7 in., 12—3 in., 20 small.

See page 275.

Connecticut. **Kansas.** **Louisiana.** **Minnesota** **New Hampshire.** **Vermont.**



Length, 450 ft. ; 16,000 tons ; Speed, 18·1—18·8 knots ; Completed, 1906–1908 ;
Armament, 4—12 in., 8—8 in., 12—7 in., 20—3 in., 30 small.

Connecticut and Louisiana have 11 in. belt instead of 9 in., and have only 2—3-in. guns at the stern. New Hampshire has two military masts in place of the towers. Minnesota has one mast and one tower.

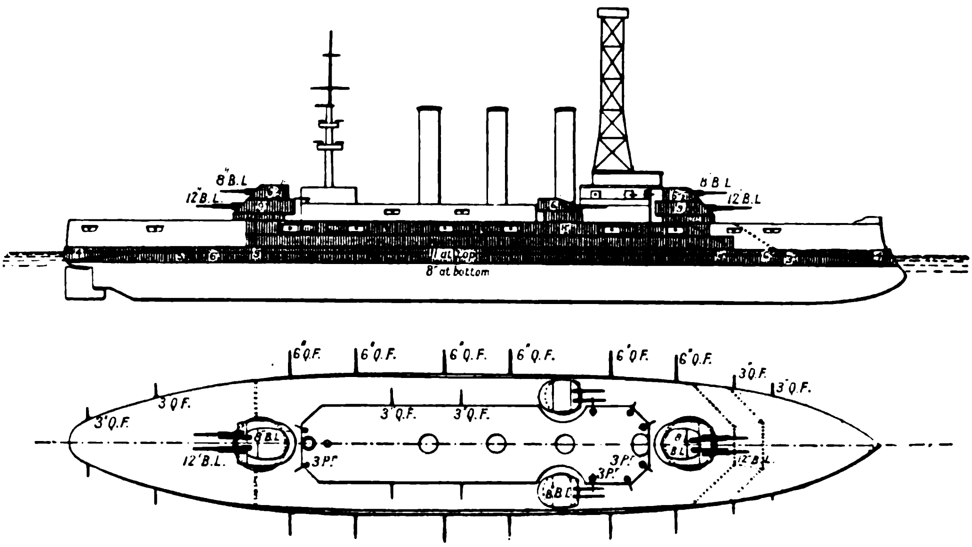
See page 275.

PLATE 77.

UNITED STATES.

BATTLESHIPS.

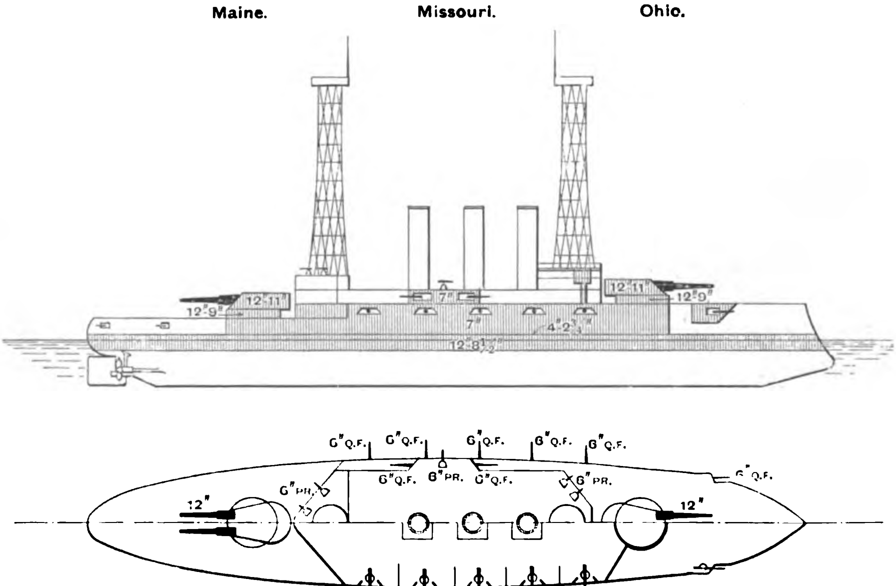
Georgia. Nebraska. New Jersey. Rhode Island. Virginia.



Length, 435 ft.; 14,948 tons; Speed, 19—19·4 knots; Completed, 1905-1906;
Armament, 4—12 in., 8—8 in., 12—6 in., 12—3 in., 30 small.

See page 275.

Maine. Missouri. Ohio.



Length, 388 ft.; 12,300—12,440 tons; Speed, 17·8—18·1 knots; Completed, 1902-1904;
Armament, 4—12 in., 16—6 in. 6—3 in., 18 small.

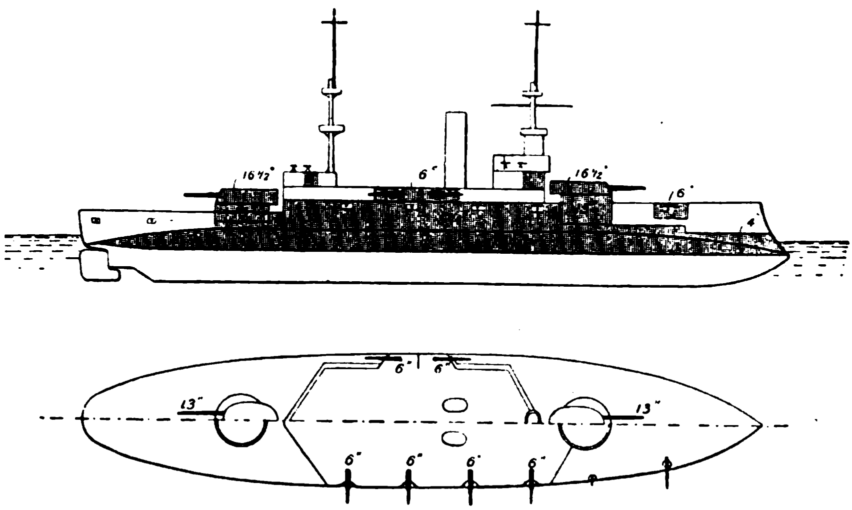
See page 276.

PLATE 78.

UNITED STATES.

BATTLESHIPS.

Alabama. **Illinois.** **Wisconsin.**

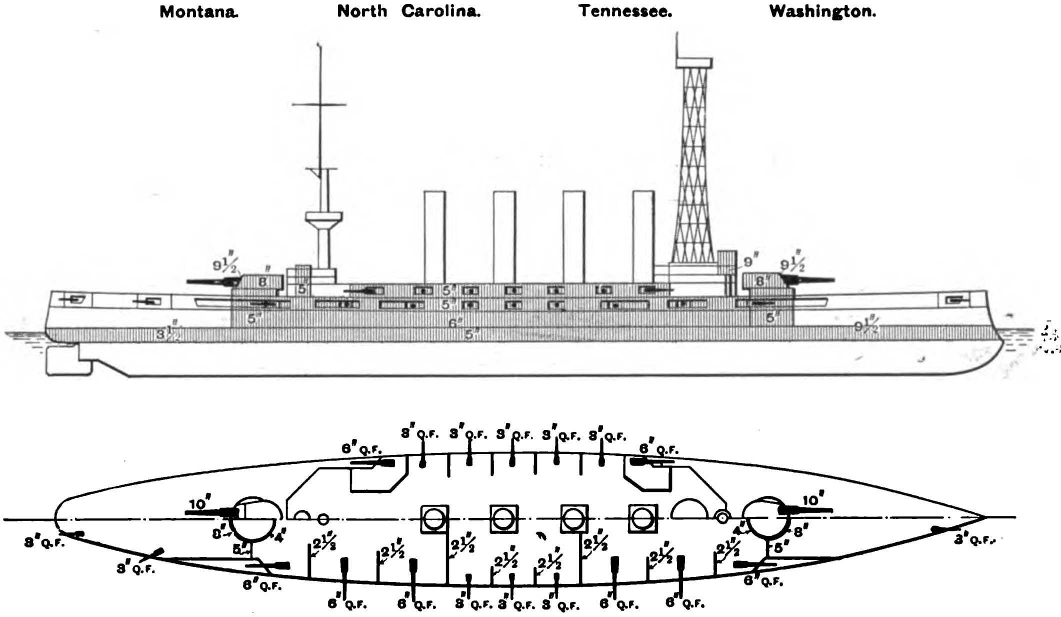


Length, 368 ft.; 11,565—11,653 tons; Speed, 17—17·45 knots; Completed, 1900-1901; Armament, 4—13 in., 14—6 in., 24 small.

See page 275.

ARMOURED CRUISERS.

Montana. **North Carolina.** **Tennessee.** **Washington.**



Length, 502 ft.; 14,500 tons; Speed, 22—22·8 knots; Completed, 1906-1908; Armament, 4—10 in., 16—6 in., 22—3 in., 22 small.

See page 276.

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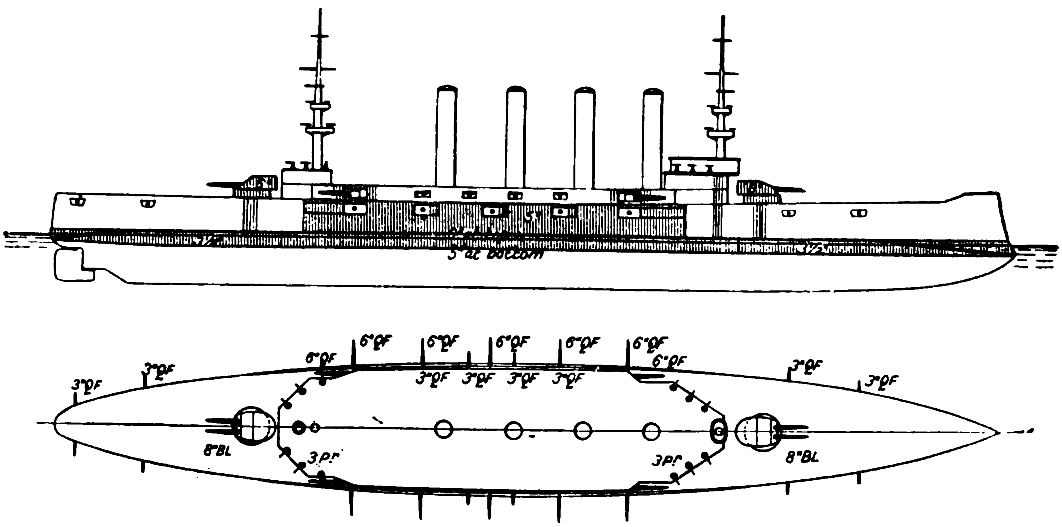
UNITED STATES.

ARMOURED CRUISERS.

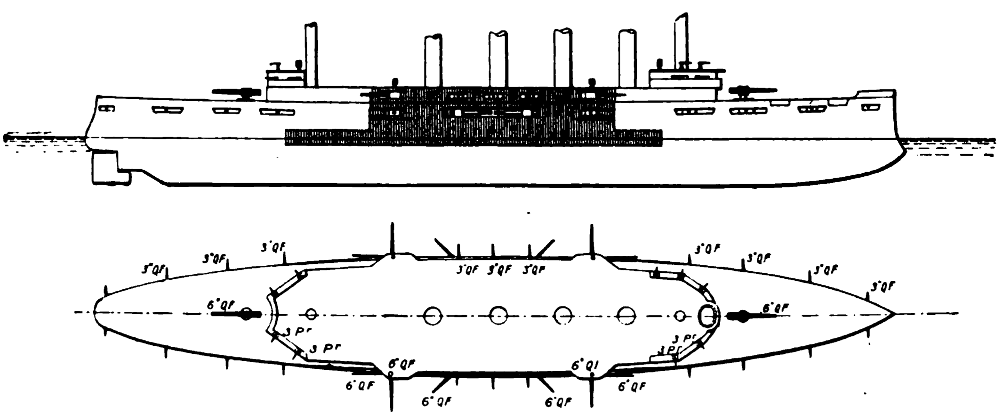
California. Colorado. Maryland. Pennsylvania. South Dakota. West Virginia.



Length, 502 ft.; 13,680 tons; Speed, 22—22·4 knots; Completed, 1905-1907;
Armament, 4—8 in., 14—6 in., 18—3 in., 30 small.

See page 275

Charleston. Milwaukee. St. Louis.



Length, 424 ft.; 9700 tons; Speed, 22—22·3 knots; Completed, 1906;
Armament, 14—6 in., 18—3 in., 36 small.

See page 275.

PART III.

ARMOUR AND ORDNANCE.

ORDNANCE TABLES.

PART III.

ARMOUR AND ORDNANCE.

Whilst in every branch of the science of gunnery and of the art of attack and defence by sea there has been marked and continuous advance, the national needs demand that considerable reticence should be observed in regard to the publication of details. Since the last issue of the *Naval Annual*, new designs of guns have been tried and accepted. There have been improvements in mountings, in projectiles, in sights, in range-finders, and similar accessories to the control of fire, in armour—for steel of greater tensile strength and higher tenacity has been made, and new processes have been evolved—while there have been many other striking indications of progress and development. In regard, however, to many of these the particulars are of a confidential character, and inventors of new appliances, manufacturers of war material, and its users alike, are restrained from affording information on the subject. A similar obligation rests with those who have to write about these matters, and it is necessary, therefore, to exercise discretion and caution in preparing this section of the *Naval Annual*. Not only is there the possibility of disclosing unintentionally what is secret, but a reference even to some changes might serve to attract the attention of and assist those who make it their business to search for information of the kind, although such business must be detrimental to the public interests. Fortunately, the scope of this section is wide, and it is possible to deal with many current topics interesting to the general professional reader as well as of some value to the technical expert, while keeping within the bounds of a proper reserve. There is ample evidence of the consistent activity of the British firms engaged in the production of gunnery specialities and improvements in war material, and of the maintenance, by their assistance and enterprise, of the position of this country in the van of progress, in spite of keen competition everywhere.

General progress.

The First Lord, who since he has been at the Admiralty has shown such a keen interest in all that concerns gunnery efficiency,

made reference, in his Memorandum accompanying the Navy Estimates, to the good progress which was being made in the manufacture and use of naval ordnance, and in his speech on the Estimates in Parliament on March 26th he dealt with some of the principal matters in connection with which that progress was being made. He pointed to the adoption by Germany, America, and Italy of heavier guns for their primary armaments, and of larger and more numerous guns for their secondary batteries, as having necessitated a further advance on our part, and this advance has meant increased outlay on the new guns and still more on the ammunition they require. There is, therefore, no abatement in the annual allowance of practice ammunition, but rather an increase, due in part to additional gunnery practices. This increased expenditure on ammunition was foreshadowed by the First Lord a year ago, in referring to the confidential committee which had been sitting to inquire into the gunnery of the Fleet, and is so far the only public outcome of the report of the committee. The delay in publishing the annual returns of target practice for the year 1912 may, however, be due to some change in the system of firing or of tabulating the results recommended by the committee. In past years the returns have been issued in time for their inclusion in the *Naval Annual*, but on this occasion they have not. The manufacture of improved designs of gun-mountings for new ships building was stated by the First Lord to be proceeding satisfactorily, and the hydraulic gun machinery and transferable gun-mountings of the ships newly completed have proved successful. As regards reserves of ammunition, these are being fully maintained, in spite of the large additions to the Fleet. Turning to torpedoes, attention was drawn by the First Lord to the circumstance that "the increased power and size of the new and more expensive torpedoes have led to an increase in the number of torpedo tubes, and the increased facilities for firing them makes it necessary to increase the supply of these more expensive torpedoes which have to be provided for use in each particular tube." It has been a matter of comment that the number of torpedo tubes in British Dreadnoughts has been less than that in the battleships of several foreign navies, and the decision to add to the number in the Iron Duke type is, therefore, interesting. The British Dreadnoughts, from the Bellerophon to the King George types, have only three torpedo tubes, which is less than the total in contemporary French, Russian, Austrian, Japanese, and American vessels, and only half the number fitted in the German Nassau and Ostfriesland classes, both of which have six tubes. The most notable armoured ships in respect to torpedo armament at the present time appear to be the Japanese

Practice ammunition.

Torpedo armament.

battle-cruisers of the Kongo class, which have eight tubes each, but the four French battleships to be laid down during 1913 will have six tubes.

Naval firing practice.

In the *Naval Annual* for 1906 there was a chapter on "The Gunnery Practice of the Fleet," in which such matters as the improvement in shooting and the altered standpoint from which gunnery has come to be regarded in the Navy in recent years were dealt with, and some of the causes of the changed conditions were described. But though the process of evolution in scientific gunnery was generally treated in that chapter, no detailed account was given of the various appliances for the improvement of marksmanship with big guns used in the Navy. Yet it seems likely that a summary of the developments which have been made in this connection should have a definite value to all students of naval affairs. It is proposed, therefore, to review the various steps which have been made in this direction, and to indicate briefly the origin and use of the different appliances which have made it possible to increase the range of big guns to ensure hitting the target, and generally of similar matters connected with the development of naval gunnery practice.

It is, of course, fully recognised that without improvements in guns and gun-mountings, in projectiles and propellants, the advance which has been so marked in the last decade could not have been achieved; but such matters are dealt with in other portions of this chapter, and will not be included here. It is intended only to refer to the adjuncts and accessories which are now employed for the control and direction of firing.

The successive stages of development in this direction may be placed in the following order:—Improvements in targets; improvements in sights; methods and instruments for obtaining the range, course, and speed of the enemy; instruments for applying the data thus obtained to the sights; methods of transmission from the control position to the guns; and instruments for concentrating the fire of the guns and firing them simultaneously. Finally, although in point of fact they should come earlier in chronological order, the various instruments will be described which have been employed to train the gunlayers and develop accuracy in aim and rapidity in loading.

Targets.

The steps which have led up to the present development in the practice of naval gunnery have been progressive, but they undoubtedly began amongst the staff officers of the Excellent in the 'eighties, when Lord Fisher was captain, Sir Charles Drury commander, and Sir Percy Scott one of the senior staff, with Captain J. Honner—now with the Armstrong firm at Elswick—Sir John Jellicoe, and Sir George Warrender on the junior staff. All these officers, it may be said,

were bold and willing collaborators in the early stages of the movement, but it fell particularly to Sir Percy Scott throughout his Service life to push it with energy and determination to its present position. Up to 1884 the only attempt at what was called "prize firing" was practice at a cask with a flag upon it, and someone aloft guessed how far short or over the shots fell. Points were awarded and prizes given for this practice, the distance of the target being about 1000 yards. Probably such a method of gun practice had obtained for a hundred years or more. William Mountaine, who published a book in 1761 called "The Seaman's Vade-Mecum and Defensive War by Sea," says, in his article on the gunner, that, by direction from the captain, this officer was to be allowed a proper quantity of powder and shot for exercise, but he does not explain how the exercise was to be carried out.

Prize firing. In 1884 a change was made in the target, a raft 40 ft. long being introduced (*see* diagram No. 1). For this important change in gunnery practice the Service was chiefly indebted to Lieutenants J. E. Meryon and R. F. O. Foote (the latter now an admiral on the retired list). Their raft had three masts and a sail area of 20 ft. by 17 ft. To attack this target, the ship steamed along a marked-out base-line, the distance of the target being 1600 yards at the beginning of the run, decreasing to 1400 yards at the middle, and increasing to 1600 yards at the end of the run. Only shots which struck the canvas counted. The results obtained from this description of firing, which remained in use until 1905, were confidential. There was no competition, and the practice was very poor.

In 1900 Sir Percy Scott, when in command of the Terrible in China, modified the construction of this target, taking the masts to the ends, as will be seen in diagram No. 2, so as to make them more remote from the sail, and thus to render the target less liable to be shot away. On the China Station points were awarded, and the ships were placed in competition with each other, with excellent results. A report of the firing was issued, with the ships placed in order of merit, and the practice was introduced by Captain (now Vice-Admiral Sir John) Jellicoe of placing the men of the top ship on the right of the line on parade.

About the same time long-range firing was started in the Mediterranean by Lord Fisher, then Commander-in-Chief on the station, and for this purpose a new target, with five masts and a sail area of 90 ft. by 30 ft., was introduced. In this target there was still the disadvantage that, if one mast was hit, the whole thing collapsed. It remained in use until 1904. Sir Percy Scott then devised a target with forty masts (*see* diagram No. 3), of 96 ft. by 30 ft. This

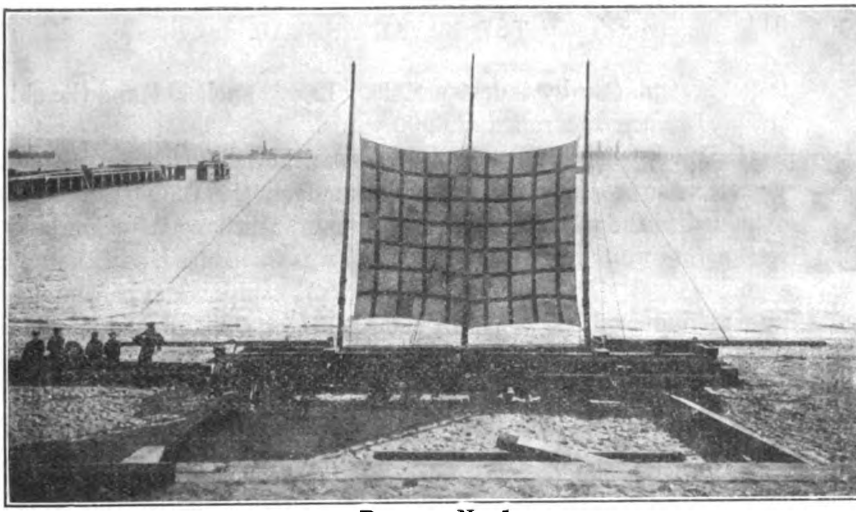


DIAGRAM No. 1.

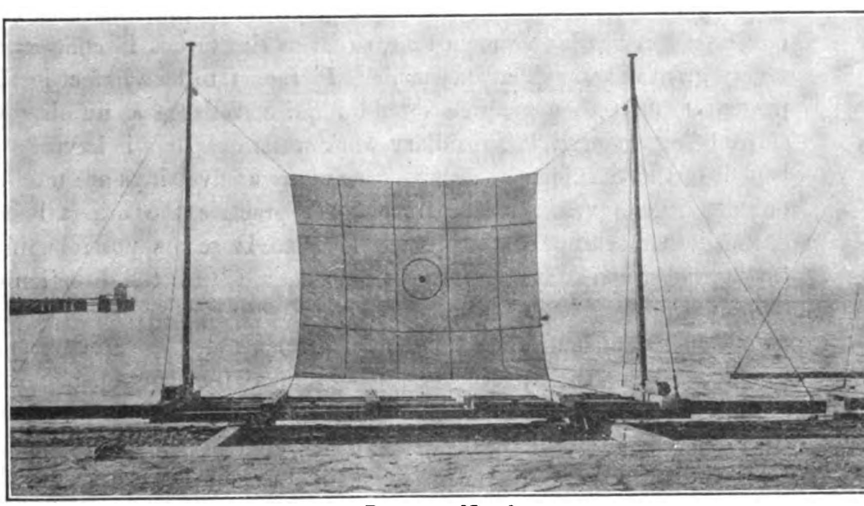


DIAGRAM No. 2.

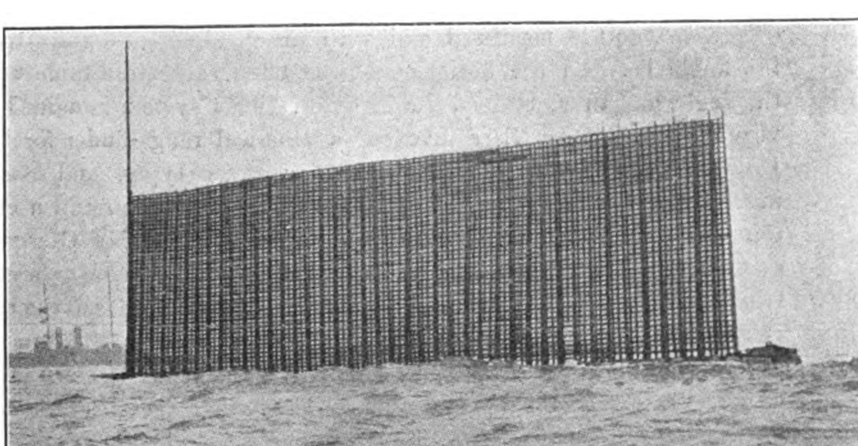


DIAGRAM No. 3.

target was practically indestructible. It was anchored, and the ships steamed past it at a range of 6000 yards.

In 1905, when Sir Percy Scott was appointed Inspector of Target Practice, the system he had inaugurated on the China Station was extended to the whole Navy. The name was changed to gunlayers' test, points were awarded, competition was introduced, and there was a phenomenal rise in accuracy of marksmanship. The percentage of hits to rounds fired, which in 1900 had been 32, and had gradually risen by 1905 to 56, jumped in the following year to 71, and in 1907 was 79, when it again fell, owing to a reduction in the size of the target and the substitution of a towed for an anchored mark. In 1905, also, a regular system of battle practice was introduced, all ships carrying out the same method of practice.

Battle practice.

While it cannot be said that the present methods of conducting either the gunlayers' test or the battle practice are the best that can be devised, it has been shown that, so far as the target is concerned, a very great advance has been made. It seems to be a defect in the present system that practice should require so large a number of ships being engaged in subsidiary work when only one is having the benefit of the training. Sometimes as many as five ships are used in order that one vessel may carry out her practice, the others being engaged in marking, or towing the target. It seems possible, if a further advance is to be made, that it should be in the direction of obtaining a target at which more than one ship can fire, to be towed at a faster rate, and thus to permit more vessels to carry out the practice consecutively.

Range-finding.

As soon as guns were manufactured with sufficient power to propel the projectile beyond point-blank range, it became necessary to discover accurately the distance of the target. From a very early period—indeed, William Mountaine, in his book, "The Practical Sea Gunner's Companion," published in 1781, describes the process—an officer went to the masthead and with his quadrant or sextant took the angle between the horizon and the target, entered a table with the angle, and thus obtained the distance. This system remained in vogue until Professor Barr invented a practical range-finder for the British service. Range-finders are of various types, and many inventors have exercised their genius upon them, but those in use in the British Navy are made by Messrs. Barr and Stroud, of Glasgow, and work upon what is called the "coincidence" system, by which two partial images of the target are brought together from the end of the base into one eye-piece, and are then adjusted into alignment by the movements of a prism, to which the range scale is connected, either directly or through suitable gearing. A standard Barr and

Stroud range-finder was described and illustrated in the *Naval Annual* of 1911.

Although within the last few years no outstanding changes in the principles of range-finders have been introduced, the actual improvements that have been effected in the existing types of instruments have had an important effect in increasing the accuracy of fire attainable at moderate ranges and in making long-range fire effective. The value of long-range fire was practically demonstrated in the engagements of the Japanese and Russian Fleets, which were fought at ranges in excess of those believed at that time by artillerists to be possibly effective. Considering that the gunnery range-finders then employed are now only regarded as suitable for navigational purposes, and that the fire-control apparatus of the Japanese Fleet was of the earliest Barr and Stroud type, it is remarkable that the percentage of hits recorded at these comparatively long ranges was obtained. The Barr and Stroud single observer range-finders in use throughout the war had a base length of 1½ yards, and were capable of measuring ranges to within ½ per cent. per 1000 yards. Shortly afterwards, range-finders having a base length of 3 yards and capable of working to within more than twice the above accuracy were introduced. At the present time the range-finders most generally employed in the service of the heavy guns have base lengths of 4 yards to 5 yards, and the latter have an accuracy of $\frac{1}{10}$th to $\frac{1}{20}$th per cent. per 1000 yards, depending upon the atmospheric conditions. Recently Messrs. Barr and Stroud have supplied a naval range-finder having a base length of 11 yards, and from the tests undertaken by the makers it has been claimed that, under average weather conditions, these large instruments are capable of measuring a range of 10,000 yards to within 25 yards. The lowest range indicated by the scale is 3000 yards, and at this distance the accuracy obtainable is to within 2 yards. So far as accuracy is concerned, it is manifest that the constructors of range-finders are able to satisfy the present and prospective demands of naval artillerists.

Barr and Stroud range-finders.

The accuracy of a range-finder is proportional to its base length and the magnification of its telescopic systems, other things being equal. In practice, however, there are circumstances that have an important influence on the results, quite apart from the weather conditions, which are beyond human control. The compactness of the design and the substantial construction of the instruments both determine the capability of a range-finder to maintain its adjustment under gun shock and continued vibration, while improved optical qualities lead to greater accuracy in range-taking. In these respects there has been a material and steady progress during past years, as

the result of increased experience and of improvements in the qualities of metals and optical glasses.

Range-taker's position.

The comfort of the operators and particularly of the range-taker is now recognised as being of great importance. A special feature of the Barr and Stroud instruments is the downward inclination of the eye-pieces, which enables the range-taker to work in comfort for much longer periods than was possible in the old type of range-finders, in which the operator was required to assume the more constrained position of looking horizontally into the eye-pieces. The range-taker is usually supplied with a comfortable seat, a support for the right arm, and, when the range-finder is to be used in exposed situations, with shields to protect his head and hands from cold winds. It is particularly desirable that the adjustment of the range-finder should be made under the most comfortable conditions, but the choice of suitable weather is not always possible, especially as the adjustment must generally be made at night upon the moon or a star. When the range-finder's station is upon the mast, the conditions are often very disagreeable. The subject of artificial adjusters contained within the range-finders themselves has long engaged the attention of range-finder manufacturers, but it is only within recent years that serviceable results have been obtained. Theoretically, it is possible to obtain an absolute infinity adjustment, but this method unfortunately necessitates the movement between two readings of parts of the adjuster, which may introduce considerable errors. The best results appear to be obtained with adjusters which involve the fewest optical parts and in which the parts are all rigidly fixed. As the errors of the adjuster must be added to those of the range-finder, it is evident that no artificial method can be so accurate as the direct method of adjusting upon a celestial object when the conditions are good. The introduction of the adjuster has advanced the science of range-finding by enabling the adjustment of a range-finder to be checked in comfort, with some degree of accuracy, at any time by day or night, but it cannot be regarded as a good substitute for the moon or a star when the conditions are particularly favourable.

Range-finding is now recognised as being sufficiently important to justify the employment of several men in the various operations. In the earlier days, the range-taker himself controlled the elevation and azimuth movements, in addition to his ordinary duty of obtaining the range. A considerable improvement in the accuracy of observation was effected by the introduction of special mountings, so arranged that the training movement could be controlled by one operator and the elevation by another, thus leaving the range-taker

free to concentrate his whole attention upon making accurate observations. At the present day it is the custom in the principal navies to entrust the control of the elevation to the range-taker. In some cases, however, a third operator is still employed to read the scale of the instrument and transmit the range.

Considerable changes have been effected within recent years in the position of the range-finders. Formerly, the gunnery range-finders were placed upon the mast. In this position the range-taker was frequently inconvenienced by the hot gases from the funnel, and the vibration was often severe. For this reason the use of mast positions for observation purposes is now less general than formerly; but with proper provision these defects may be removed, when the range-taker will certainly be placed upon the mast again. In several large navies it is the practice to instal range-finders of five yards base in one or more special armoured towers at about the level of the gun-turret. Again, all the larger navies have in recent times installed range-finders of three or four yards base length in the gun-turrets. In some cases, indeed, Barr and Stroud five-yard range-finders are being installed. The range-finder itself is placed immediately above the turret roof, under a hood, the faces of which are suitably sloped. A hole is cut in the turret roof under the hood to accommodate the head of the range-taker. The trainer occupies a position on a lower level entirely under the roof armour, and he is provided with a large angle prismatic sighting telescope, attached to the mounting. The Barr and Stroud turret range-finders have the eye-pieces arranged to look in horizontally, so as to reduce as much as possible the necessary head-room under the hood, but where the head-room is not restricted, the makers supply range-finders having the more comfortable arrangement of eye-pieces inclined downwards at an angle of about 45 degrees. Most frequently the range-finders are installed within the rear end of the turret, or even in a special compartment attached to the outside of the rear wall, and overlooking the roof. This arrangement is necessary when the accommodation within the inside of the turret is very restricted. A position at the front of the turret would probably be more advantageous, but the necessary space for the accommodation of the operators is seldom available. The 11-yards range-finder constructed by Messrs. Barr and Stroud is mounted entirely within the gun-turret, with the ends projecting to a small amount beyond the side walls. Cast steel splinter-shields are attached to the sides of the turret to protect the ends of the range-finder.

Range-finder mounting.

When the distance of the target is obtained, it is necessary that it should be passed without delay to the guns, in order that the sights

may be adjusted to the range. Practically until the beginning of this century the distance was shouted by an officer, and passed along by word of mouth. It is true that in 1881, when Sir Percy Scott was in the Inconstant, he invented an electrical instrument for passing the distance to the guns, but the Service was not prepared at that time for innovations of the kind, and the instrument was eventually used for a much less scientific purpose. About 1900, Messrs. Barr and Stroud supplied a simple electrical transmitter at the masthead and a receiver at each gun. This instrument, although minor improvements on the original design have been effected from time to time, is still installed in most modern warships, both of our own and foreign navies. The transmitter is worked by hand, commutates an electric current, and the commutated current passes by means of insulated wires to the receivers, causing them to work in conformity with the motions of the transmitting handle. By this transmitter not only ranges, deflections, and bearings, but general orders, etc., may be conveyed from the control position to the guns.

Range transmitter.

Another range-indicator and transmitter by which the same idea of saving time is carried out is that of the Vickers "Follow-the-Pointer" system, which was described in the *Naval Annual* for 1908. In this method the range and deflection are transmitted from the fire-control station direct to the sights on the guns, thus facilitating the work of the sight-setter. The range or deflection found at the control station is received directly at the sight by electrically-controlled pointers, which are rotated in front of the respective dials, and indicate the point to which the dials have to be set for such range or deflection, thus greatly facilitating the sight-setting. In addition, correction is applied automatically to the range-pointer to compensate for loss in muzzle-velocity due to erosion of the bore of the gun or change in temperature of the charge. The system of Messrs. Vickers has been further developed since it was described in 1908, as will be seen by reference to later issues of the *Naval Annual*. The transmitter instrument has been simplified, and not only indicates the range as given by the range-taker, but has the further advantage that any spotting correction can be added by an independent handle.

Spotting.

Above mention has been made of "spotting." This is the simplest form of fire-control, and simply means that an officer aloft judges how far short of, or over, the target the projectile goes by its splash. The sights are then raised or lowered as may be necessary.

Fire-control.

The next step to be noted is a still more important one. The range of the target being found and transmitted to the sights, corrected by the spotter, it still remained to take into account the fact that the enemy's ship would be moving. Owing to the time

taken by the projectile to traverse the long distance at which it is possible to open fire effectively, the problem of hitting a moving object must be one of some complexity. In addition to knowing the range, it is necessary to know the rate at which the range is changing, inasmuch as if the vessels are approaching one another, the gun-sight range will be less than the true range, and if the distance is increasing, it will be more. It is, moreover, necessary to make allowance for "deflection," or the effect of the relative motion of the two ships at right angles to the line of sight.

Mr. Pollen's inventions.

The first person who would appear to have turned his attention to this matter is Mr. A. H. Pollen, who in February, 1900, when a guest on board the Dido, saw for the first time in his life a naval gun fired. The range was 1400 yards; the target was towed, and he was astonished at the accuracy of the shooting. By a curious coincidence he had been reading an account of what had been done by the naval guns in the defence of Ladysmith, and it occurred to him as strange that while the 4·7-in. gun was said to have silenced the Boer "Long Toms" at a range of five miles, here at sea the same gun was being used at a range of less than one mile. He was told that practice could not be carried out at a greater distance for want of an accurate range-finder. This incident led to his investigating the subject of naval gun firing, and he was surprised to find that if two ships are approaching one another at a combined speed of 50 knots, and the first shot was fired at a range of 10,000 yards, the range would have altered by nearly half a mile while a 6-in. projectile was in the air. It was, therefore, not only the absence of a range-finder that accounted for the short distance at which naval firing was being carried out, but because no one had yet solved the problem of how to ascertain the future position of the moving target and to lay and train the guns accordingly. The conclusions at which Mr. Pollen arrived were, firstly, that the only clue to the future position of the target must be found in its past movements; secondly, that the only conceivable information of its past movements that could be obtained must be the observation of its successive previous positions; thirdly, that if these were plotted, with due allowance for the progress of the observer's ship through the water, a plan would result; and, fourthly, that from such a plan the forecasting of the future ranges and the angle of deflection must be a mere matter of calculation.

From these conclusions, Mr. Pollen went to work, and has ultimately devised a method of ascertaining the target's speed and course that is almost automatic. He has also devised a change of range machine for automatically supplying a forecast of the ranges

to the guns. This machine not only generates the future ranges and bearings of the target at the true rate of change, but, like his plotting table, can be corrected for any change of course by the observer's own ship.

Vickers rate-of-change clock.

Although Mr. Pollen was first in the field, and has apparently succeeded in perfecting instruments of incalculable value for finding and keeping the rate at long range, there are several other inventions in use for determining the rate of change of range, some in conjunction with the range-finder and others independently of such an appliance. In the former case the Vickers rate-of-change clock device may be employed. As already explained, here a pointer rotates forwards and backwards over a dial at a rate capable of being varied at will. A setting of the dial relatively to the pointer enables the initial range to be indicated, after which the rate of motion of the pointer is adjusted so that subsequently indicated ranges upon the dial shall correspond as nearly as possible to those given by the range-taker. The adjustment of the angular velocity of the pointer is effected in a well-known way by varying the radial position of a roller frictionally driven by the face of a disc rotating at a uniform speed.

Capt. Dumaresq's clock.

As illustrating a method of determining the rate of change and deflection, independently of the series of ranges given by a range-finder, there should be mentioned an instrument devised by Captain J. S. Dumaresq, in which the speed of the observer's ship and the estimated direction and speed of the target are combined in such a way that the rate of change of range and the deflection may be read off upon a suitably graduated map surface. To avoid the danger of misreading the rate and deflection scales, an instrument known as the "Rocord" has been devised by Messrs. Barr and Stroud. This apparatus works upon the same principle as the Dumaresq instrument, but it determines the rate of change and the deflection automatically, and indicates them upon drums either directly at the instrument or by electrical transmission at any distant stations. If the velocity and direction of motion of the target were accurately known, this method would be preferable to that of depending upon successive range-finder readings, as it would give an instantaneous reading of the rate of change, whereas some time is required for the determination with a range-finder. While, however, the speed and course of the enemy are only guessed at, the results may be considerably in error. It seems, therefore, desirable that both methods should be available so as to furnish a mutual check upon one another, more especially since continuous range-finding observations are not always possible in actual warfare owing to the target being

obscured by smoke. Even when every allowance has been made for the chances of error already mentioned, allowance must also be made for the condition of the gun and the temperature of the charge. This is why it is customary to correct the sighting by spotting in the way described above.

It has been shown how by various steps the field was opened to officers and others with special scientific attainments to come forward and elaborate a system by which battle practice could be carried out in the Fleet. Perhaps the scientific control of firing was pushed at first to too great a length, and was too elaborate for the conditions of work at sea. This, after all, was only to follow the usual trend of events. Any new movement or invention starts with most complicated means for carrying it out, but later developments always tend in the direction of simplification. So it may be seen with the control apparatus of warships. Most of the elaborate fittings originally introduced have been modified and simplified to meet the practical needs of the sea Service. The latest development is the revival of the old director firing of years ago, which in consequence of the poor apparatus then available was abandoned as being inefficient. **Director firing.**

For this important development the Navy is indebted again to Sir Percy Scott. He never lost sight of the value of being able to direct a vessel's guns from a central station, where the range and the corrections could be calmly and quietly thought out apart from the confusing noises which must prevail as distracting elements in the vicinity of the guns. He studied and watched, and as the sighting and laying machinery became more and more perfect, he developed the present system of controlling the fire of the heavy guns from this central station, which has given such satisfactory results.

No doubt at one time in the Fleet there was and may still exist a tendency to depend too much upon the control officers and their instruments to the neglect of the individual training and practice of the gun and turret layers, thus losing sight of the fact that the chances are strong against the installation of instruments holding out for more than a short period at the beginning of an action, and that the final result must be determined, as it ever has been, by the individual working the gun and individual effort.

Before leaving this portion of the subject, it is only just to direct attention to the many naval officers other than those already mentioned who have distinguished themselves in the gunnery field and in the development of modern fire-control. For instance, there should be mentioned the work which Rear-Admiral R. H. Peirse, now Commander-in-Chief in the East Indies, did while Inspector of Target Practice. There can be no doubt that under his direction

and that of his successor, Rear-Admiral Montague E. Browning, the department of the Inspector of Target Practice has become the focus of the gunnery brains of the Navy, and practically every departure of value made in the last few years has originated within it. It is quite natural that a body of officers whose business it is to inspect, record, and report on every firing of importance done by every ship in the Navy, in Home waters, and in the Mediterranean, should obtain an experience the value of which cannot be over-rated, and with it an authority that can hardly be resisted. It is owing to this circumstance that the view has been expressed here that, instead of being merely Inspector of Target Practice, the officer who holds this post ought also to be Director of Gunnery Practices and Technique.

Individual effort. The first authoritative writer on fire-control was Captain E. W. Harding, R.M.A., who, under the pseudonym of "Rapidan," wrote the articles on the tactical employment of naval artillery reproduced in *Engineering* in 1903. This was the first exhaustive analysis of the subject, and has been made the basis of many subsequent disquisitions in this country and elsewhere. Fire-control owes a great deal also to the work of the experimental department at Whale Island, some of the most fruitful years possibly being those when it was under the control of Commander A. W. Craig, now captain of the Orion. The late Captain F. C. A. Ogilvy, principally known as a torpedo specialist until he took command of the Revenge, was associated with all Sir Percy Scott's earlier work in China, and after he became captain influenced naval gunnery in many important respects, principally perhaps by the extraordinary shooting that he produced in the Natal, which, first when he commanded that ship, and then when under the command of Captain W. R. Hall, in successive years eclipsed all records. It was only Captain Ogilvy's untimely death that deprived the Service of his maturer view on the subject of fire-control, for he died just at the beginning of the experiments with the Pollen system in the Natal, the value of the results of which might have been more adequately realised had he survived. Captain C. Maxwell-Lefroy, Commander A. V. Vyvyan, Commander F. C. Dreyer, Commander Backhouse, and many others, have devised means for improving fire-control organisation or appliances at different points. The debt of naval gunnery to torpedo officers is shown by the fact that Sir Arthur Wilson, Captain Ogilvy, and Captain Dumaresq, all of whom profoundly influenced the development of modern fire-control, as well as Vice-Admiral Sir Frederick Hamilton, who was successively captain of Whale Island and Inspector of Target Practice, specialised in this branch. Mr. L. Newitt, the chief electrical engineer at Chatham Dockyard, should

be mentioned for his co-operation with Commander Vyvyan in the production of the Newitt-Vyvyan automatic sights, and for his recent invention of the photographic aim recorder, which photographs the target in exact relation to the cross wires of the sight at the moment of firing. It is hoped by many specialists that this invention, when fully developed, will prove an invaluable aid in the training of gun-layers. These notes refer entirely to the development of apparatus for improved marksmanship in the British Navy and to the evolution of fire-control, or the work of foreigners in the same direction might be included. In that case, credit should certainly be given to Rear-Admiral Bradley N. Fiske, of the United States Navy, for the invention of the naval telescopic sight as early as 1892, and for many improved appliances in connection with range-finding. **Aim recorder.**

Of equal importance in the development of the practice of naval gunnery to the instruments used for directing fire in action are the methods and mechanism for training the men in the use of their weapons, and assuring the highest standard and the best results from the efforts of individuals. The subject may be divided into three parts—the instructional apparatus employed to train the gunlayers and develop accuracy in aim and rapidity in loading; instruction in the drill batteries with miniature apparatus, which allows of an almost unlimited number of rounds being fired at a minimum cost; and, when the men's eyes and hands have been sufficiently trained to ensure that it would not be wasted, the more expensive practice of actually firing the heavy guns themselves. Such practice leads to further progress being made.

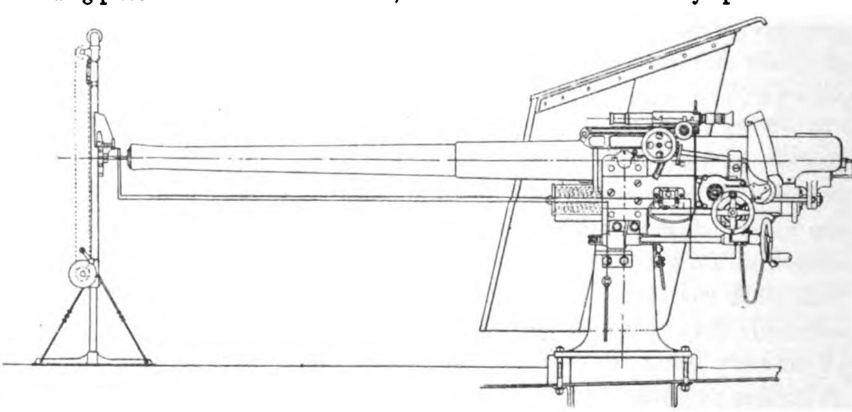
The preliminary instructional appliances consist of dotter instruments, deflection teachers, and sub-calibre apparatus. These relate to training in aiming and firing, and to them may be added the loading teacher for breech-loading guns, which enables the loading numbers of quick-firing guns to be exercised in their duties without causing wear to the guns themselves, and, furthermore, admits of an endless series of loading operations being performed which could not take place in the gun.

The "double action" dotter. The following is a description of apparatus, with illustrations, as provided by the Armstrong firm. Sir Percy Scott was the inventor of the "dotter," of which there are two kinds, known as double-action and single-action respectively. The former is a device by means of which men can be trained to work the elevating wheel of heavy guns in accordance with the roll of the ship, and to lay their gun on an object without the actual expenditure of ammunition. This mechanism, as shown in the illustration on the next page, establishes a union between the eye at the sight and the hand on the

elevating gear, which is necessary for the captain of the gun to acquire to enable him to keep the sights on the target while the ship is rolling.

The arrangement provides a moving target just past the end of the gun, which the gunner must follow with his sights, and when he is on the target he pulls a trigger in the usual way which indicates on a recording apparatus, by the aid of a moving aiming mechanism, the record of his shot.

The target is operated by an attendant, who can move it up and down or sideways as instructed. The moving aiming mechanism is suitably connected to the muzzle end of the gun and operated with the working of the same. Both are fitted to a carrying frame, and may slide vertically or horizontally, each independent of the other. The aiming mechanism consists of an electro-magnet, suitably mounted, and in circuit with the firing pistol of the gun, so that when the operator chooses to fire electric connection is made and the magnets attract an armature, forcing the marker forward in the required direction. Immediately on the release of the pistol trigger, the armature is liberated, and the spring brings back the same into its normal position. At the same time a pointer is moved one point round, thereby indicating the number of the shots made at any one trial. The mechanism is fixed on to a sliding piece for horizontal movement, which in turn moves vertically up and down



DOUBLE-ACTION DOTTER APPLIED TO B.L. GUN.
Armstrong Fitting.

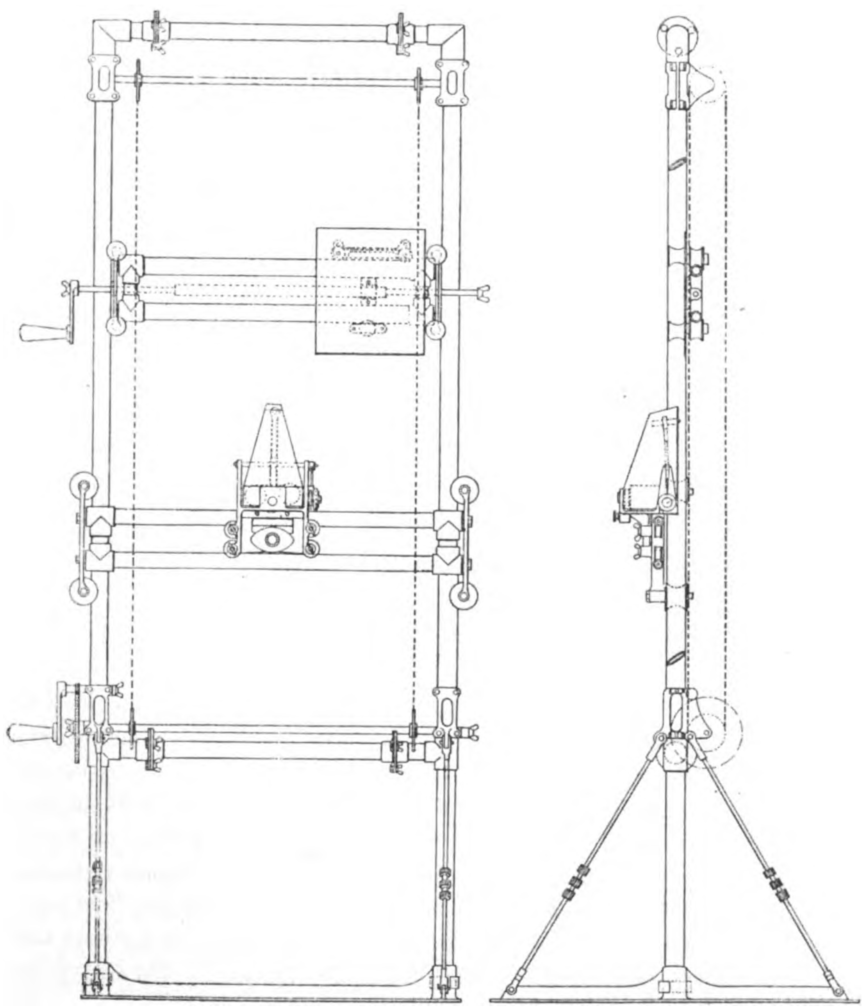
the frame. Connection with the gun muzzle is made by means of a ball and socket joint.

The target consists of a plate suitably mounted on a sliding piece for both vertical and horizontal movement, the horizontal movement being performed by revolving a screwed shaft geared into a nut on the back of the target, the vertical movement being carried out by two endless chains connected to the sliding piece, the same being driven by means of a handle. The mechanism has been arranged to be worked from the right or left hand side of the dotter by changing over the handles, butterfly nuts being provided so as to enable this change to be carried out in the shortest possible time. The frame is so arranged that the aiming apparatus shall move on the front side of the same and the target on the back. Indicator papers are fixed on the brass target plate by means of elastic bands. An illustration of the double-action dotter is given on the opposite page.

The "single-action" dotter.

A device very similar to the above is the single-action dotter, and by its means men can be trained to elevate and depress heavy guns in accordance with the roll of the ship. The apparatus consists essentially of two parts—the target, which can be moved up and down by hand, but not sideways, and the recording apparatus, which is attached to and is moved with the gun as it is elevated or

depressed. Successive shots are recorded in the form of a series of "dots" equally spaced with regard to each other horizontally, but varying as regards their vertical position in accordance with the position of the sight line with regard to the object aimed at when the trigger was pulled.



THE DOUBLE-ACTION DOTTER.

Armstrong Fitting.

The deflection teacher is an apparatus designed for the practical instruction of men in the important duties of aiming, sight adjusting, and the intelligent carrying out of the "aimer's" instructions by the training numbers. The apparatus is attached to the gun A deflection teacher for a pair of 14-in. B.L. guns.

mounting, as shown in the illustration on the opposite page; the training, elevating, and sight setting are used as they would be in the actual working of the gun.

The important items in the apparatus are: 1, the target; 2, the rifle; 3, the bullet box, and 4, the gun sight. The rifle and gun sight can, within limits, be diverted from the axis line of the gun as desired. The rifle and bullet box remain in any chosen relative position, but a limiting stop prevents the rifle ever firing outside the bullet box. The target can be caused to assume any position. The essential facts are that if the sight and rifle converge at the range of the target, the spot on which the sight is laid is struck by the bullet, and that if they are not so convergent, the convergence can be obtained by giving elevation and deflection to the sight.

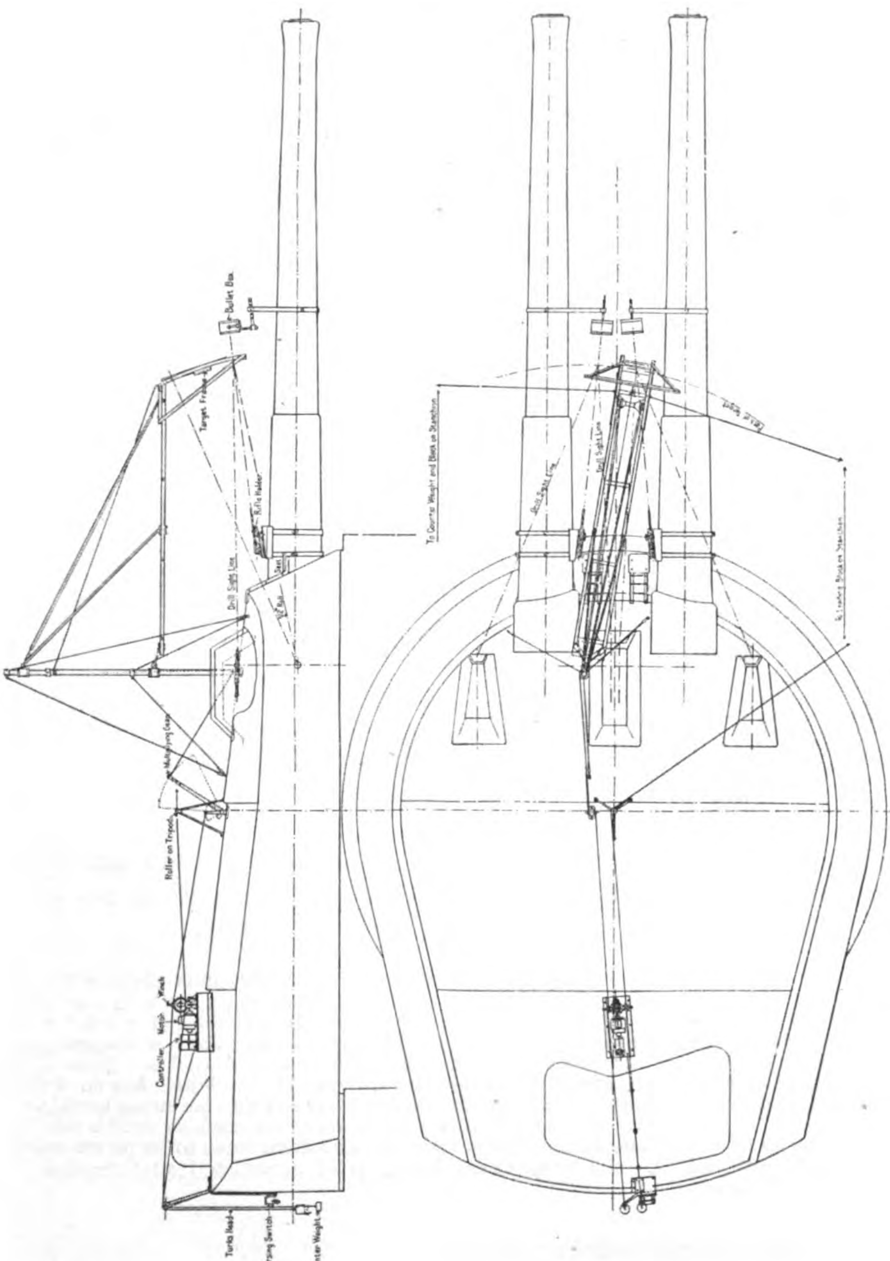
The rifles are carried in adjustable holders secured to the gun body by means of steel bands, and are fired by means of electro-magnets carried on their lock frames and coupled up to the firing circuits of the guns. The bullet stopper box is attached to the gun by a steel band. Two seats are provided at the front of the mountings for the use of the rifle loaders. The target boom is made of wood, and is swung from a steel tubular mast secured to the roof of the mounting. This boom is fitted at the front end with an arc, struck from the centre of the gun trunnions, in which the wood target frame moves. Winch gearing for working the target is provided, with adjustable arms which admit of a variety of different movements being given to the target. The winch is driven by an electric motor, and the speeds of running are regulated by a controller. At the rear of the mounting is carried a reversing switch, which automatically reverses the running of the motor by means of two Turk's heads worked in the wire rope. A tripod and guide roller is secured on the training centre of the mounting to give a fair lead to the running ropes, and a multiplying gear for increasing the elevation of the target is secured near to it. Drill sights, specially fitted for converging upon the target, are provided for use in place of the gun-sights.

What may be described as an intermediate stage of instruction is carried out by the use of an aiming tube inside a gun and carrying out practice at longer ranges than the deflection teachers are intended for. In this stage rifle ammunition is used, and later, in the larger guns, smaller pieces are inserted in the bore, and permit of practice closely simulating the actual thing. The introduction of these tube cannon was really a progressive step, as the practice from them admits of the exercise of the control officers, range-takers, and others under conditions closely approximating the practice with the heavy guns themselves.

Rifle-calibre aiming tube.

A Service rifle may be fitted as an aiming tube in the following manner:—

The apparatus consists of a Service rifle lock and barrel placed in a breech rear disc, which is screwed to suit the breech opening of the parent gun, the rifle being secured to the rear disc by a nut on the front side. A front disc is provided for centring the rifle in the bore. The rifle is loaded by hand and is fired by means of an electro-magnet carried upon the lock frame of the rifle. This magnet is actuated by the main firing pistol of the gun, and in this manner the same process of aiming and firing is gone through as is necessary for the parent gun.



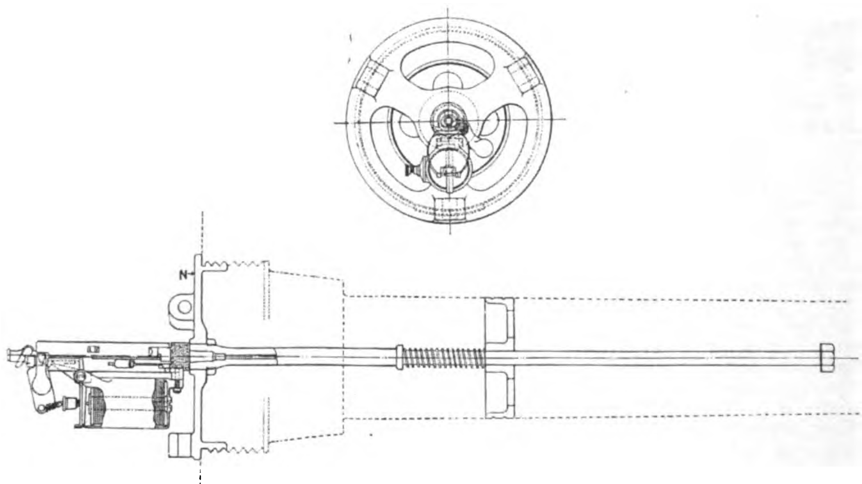
Deflection Teacher for a Pair of 14-in. Guns.

Armstrong Fitting.

6-pdr. sub-calibre aiming tube in a 14-in. B. L. gun.

A 6-pdr. gun fitted complete with its mechanism may be, as described below, specially prepared as an aiming tube for heavy guns.

The exterior of the tube is provided with a series of rings with keyways cut through them. A steel collar is provided, grooved on the interior to take the tube, and its exterior screwed to suit the parent gun. It is secured by a bronze block and a clamping nut. The tube is further supported by means of a bronze ring, which fits into the obturator seating. The tube is fired by means of an electro-magnet coupled up to the firing circuit of the parent gun, and consequently the operation of firing by the "aimer" is the same as for the parent gun.



Rifle-Calibre Aiming Tube for 4·7-in. Gun.

Armstrong Fitting.

Loading teacher.

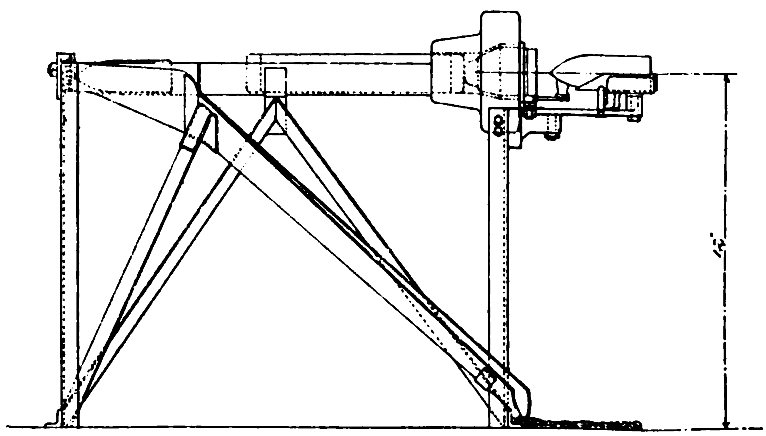
The loading teacher, shown in the illustration on the opposite page, is arranged so that practice as in Service conditions can be obtained in the various operations of loading and firing.

The mechanism consists of a strong framework of steel built up in the form of a stand, with a trough representing the chamber of the gun, and a chute to convey the shot back ready to be picked up for loading. A cast-iron breech end is fitted to this frame or stand representing the breech opening of the gun. The breech opening is closed with a cast-iron carrier breech block, hand lever, and catches. There is also a loading tray as shown, standing out at right angles to the breech face on the left side. The shot is placed upon the tray, and the tray and shot are swung quickly against the breech face, causing the shot to slide along the chamber until it rolls sideways into the chute, down which it slides to the bottom ready to be picked up by the men loading. The dummy cartridge is loaded immediately after the shot leaves the tray.

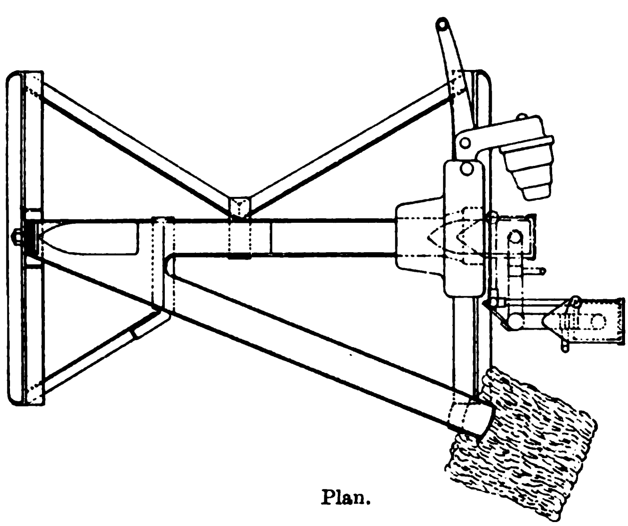
Practice is obtained as follows:—

The gun's crew being in their places round the loading teacher, the operations are gone through in the requisite order, *i.e.*, the breech opened by the hand lever, the shot placed on a tray, then swung against the breech face, charge thrust in, breech closed, dummy primer inserted in the primer hole, and breech locked, these operations being repeated until proficiency and speed are obtained.

However good and however well used such apparatus as is described above may be, it can only be employed for preliminary training leading up to the essential practice at sea under conditions approximating as nearly as possible to those of actual conflict. Such practice is, of course, expensive, but it would be absurd for a country



Elevation.



Plan.

LOADING TEACHER FOR 4·7-IN. GUN.
Armstrong Fitting.

to possess a navy and shirk the necessary expense to enable its officers and men to make the most effective and best use of the excellent material placed in their hands. To undue economy in this direction must be attributed the inefficiency at sea and the waste of strength of some countries which have recently been in a state of conflict.

This has not always been due to the actual cost of the ammunition, but as much to the fear of wearing out the ships' guns, and of their being, therefore, unfit for a call to battle. But it must be expected that guns will wear out, and the remedy is an adequate provision of ordnance in reserve for use in times of emergency. The nation which neglects this provision is wasting money in having warships at all.

Heavy guns.

Both at home and abroad, developments in the design and manufacture of heavy ordnance continue in the direction of weapons of increased calibre and power. Within a comparatively few months of the substitution of the 13·5-in. or 14-in. gun for the 12-in., which had held the field as the principal naval weapon for so long, the former are being succeeded by a 15-in. gun, while weapons of 16-in. calibre now appear in the Elswick and Krupp tables of ordnance. Some check on the tendency to increase the calibre might have been expected from the introduction of the triple turret, which provided an alternative plan for adding to the power of the ship's armament, but during the past twelve months, as far as present information goes, no other Powers have adopted this system of distribution, although this may only be due to a desire to await the results of experience with the first ships in which it was tried. Meantime, not only those navies which adhere to twin turrets are increasing the calibre of their newest guns, but Italy herself, the pioneer of the triple turret, is reported to have decided on an armament of 14-in. guns for the Dandolo and Morosini, begun last year, and of 15-in. guns for the Giuseppe Mazzini and Goffredo Mameli, to be laid down during 1913. Likewise, in Austria, where Italy's example was followed, the next new ships will be armed with a gun of larger calibre than those carried in the Viribus Unitis class, possibly a 13·4-in., for, as Admiral Count Montecuccoli stated before the Austrian Delegation in October last, other countries had adopted guns of larger calibre than the 12-in., and Austria-Hungary must follow suit. Whether or no the real cause of this movement for bigger guns in the main armament of battleships is the moral effect produced by them, as Admiral Sir Cyprian Bridge believes to be the case, it is clear that the concensus of opinion among naval artillerists favours an increase of calibre rather than an increase of numbers. Reviewing the armaments of the new ships building or projected for Russia, Italy, Austria, Greece and Chile, it may be said that the 12-in. gun has now been surpassed all over the world.

Foreign advance.

At the time of writing, no definite information is obtainable concerning the number or calibre of the heavy guns of the German battleships and battle-cruiser of the 1911–12 programme. More than one Continental report has credited these ships with a 15-in. (38-cm.)

gun, but though such a gun appears in the Krupp table of ordnance, in the absence of confirmation all statements must be accepted with reserve. On the occasion of the launch of the König, the first ship of this programme, on March 1, 1913, the armament was stated unofficially to include ten 14-in. guns, which, if correct, would make the vessel comparable in this respect with the British King George V. type, of the 1910–11 programme, the name-ship of which was completed at the end of 1912.

In America there has been no change in the calibre of the principal naval gun, but the Pennsylvania, of the 1912–13 programme, will mount twelve 14-in. guns, as compared with the ten in the four ships of the two preceding programmes. Judged by the weight of metal thrown by all the guns when fired simultaneously, this armament of twelve 14-in. guns is the most powerful yet devised about which there is definite information. The weight of the American 14-in. projectile being 1400 lb., the twelve guns in the Pennsylvania could discharge 16,800 lb. in one round, while the new British battleships, reckoning the weight of the 15-in. projectile at 1950 lb., could discharge 15,600 lb. in one round. The difference is comparatively small when the increase in other elements of efficiency in the British design is borne in mind. **United States.**

French constructors also adhere in their newest ships to the same calibre of heavy gun, viz., 13·4-in., but, like the Americans, they are raising the number mounted from ten to twelve, concurrently with the introduction of a new form of distribution in the quadruple turret. An alternative armament of sixteen 12-in. guns was considered and rejected. **France.**

In Russia, the four new battle-cruisers of the Navarin type are expected to be armed with 14-in. guns, but there is at present no certain information on this point, nor has the number to be mounted been disclosed. The four Sevastopols, launched in 1911, and the three Imperator Alexanders, begun in that year, mount, of course, twelve 12-in. guns. **Russia.**

In the Dandolo and Morosini, Italy has advanced from a 12-in. to a 14-in. gun, and the mounting of ten of the latter calibre makes these ships comparable with the United States battleships Nevada and Oklahoma. The traditional Italian originality is more in evidence in the reported design of the two projected vessels, Giuseppe Mazzini and Goffredo Mameli, for which alternative designs for nine and twelve 15-in. guns have been considered. The mounting of twelve 15-in. guns would make the Giuseppe Mazzini type more powerful than the American Pennsylvania, and therefore for the time being the most powerful in the world, assuming that all the guns fired on either broadside. **Italy.**

Although no credits have yet been obtained for a new Austrian programme, the design of the next vessels to be built for the replacement of the Monarch class is expected to include an armament of ten 13·4-in. guns, but in the interval before the ships are actually begun the plans may be influenced by Italian progress.

As regards Japan, authentic particulars of the armament of the Fuso are lacking; but if, as anticipated, she will mount twelve 14-in. guns, her armament will be similar to that of the American battleship Pennsylvania. Japan is now undertaking the manufacture of her own heavy ordnance, the guns of the Fuso, and of the three battle-cruisers Hiyei, Haruna, and Kirishima, being provided by the Japan Steel Foundry's Works at Muroran, while the breech-blocks and other parts are being made at the Kure naval arsenal.

Disposition of guns. Turning to the question of the disposition of the armament, the principal new factor of importance to be noticed is the adoption in France of the quadruple turret for the four ships of the Normandie class to be begun during 1913. In a measure, this move may be said to be typical of a general desire for the concentration of gun-power, but the change from two to four guns in a turret which the French have made is a very bold one, and its results will be awaited with keen interest. The Normandie and her sisters will carry twelve 13·4-in. guns, compared with ten in the Bretagne class, and they will be disposed in three quadruple turrets, placed, of course, on the centre-line of the ship, well above the deck, with a wide arc of training.

No other startling innovations as regards disposition are to be observed at the present time. In the British Queen Elizabeth type, twin turrets on the centre-line will, no doubt, be again the rule, as it may be found to be in Germany, when particulars of the newer ships are forthcoming. The Italians, in the Andrea Doria and Duilio, are mounting thirteen 12-in. guns in a similar way to those in the Conte di Cavour, while for the ten 14-in. guns in the main armament of the Dandolo and Morosini they are copying the American example in the Nevada of two triple and two twin turrets, all on the centre-line. In the two next ships, whether nine or twelve 15-in. guns are mounted, the triple turret method is likely to be the only one adopted. As regards Austria, it may seem premature to discuss the matter of the distribution of armament of ships which have hardly yet reached the projected stage, but, according to newspaper accounts, the vessels to be built in place of the Monarch class will copy in this respect either the British Orion or the American Nevada. In making the ultimate decision, Austria will have the benefit of her experience with triple turrets in

the Viribus Unitis class. The Americans have gone in for the triple turret altogether in the Pennsylvania, whose twelve 14-in. guns will be disposed in four turrets on the centre-line. The number of turrets is thus the same as in the Nevada and Oklahoma, but three instead of two guns are placed in each of the amidship turrets. Four years ago, it is interesting to recall, the Americans mounted the twelve 12-in. guns of their Arkansas type in six twin turrets, but this plan of armament and distribution was not repeated, first the British example of a heavier weapon, and then the Continental example of three guns in a turret, being followed instead. An important influence in favour of the triple turret in America is the increase in armour protection adopted as a result of the San Marcos trials. Indeed, Rear-Admiral Twining, the Chief of the Bureau of Ordnance, is reported to have expressed a dislike for the triple turret but to consider it inevitable in view of the great weight of protection demanded. The methods of gun distribution adopted by the minor Naval Powers which have gone in for Dreadnoughts copy in the main those of the country in which the ships are being built, but an interesting and important exception to this rule is the case of the Brazilian Rio de Janeiro, which not only has fourteen 12-in. guns in her principal battery—a greater number of heavy guns than has ever before been mounted in any vessel—but has them disposed in twin turrets, and has each turret placed on the centre-line. In the Greek battleship building at Stettin, the eight 14-in. guns will be twin mounted on the centre-line. On the whole, therefore, it will be seen that the diversity of practice in regard to the disposition of the guns in the main armament is as marked as ever.

The following description of an Armstrong triple gun-mounting will be read with interest, although recent reports of the trials of the Viribus Unitis, and a review of the systems of distribution of heavy guns in the latest armoured ships, seem to suggest that this method of mounting will not be so widely adopted as might at first have been expected.

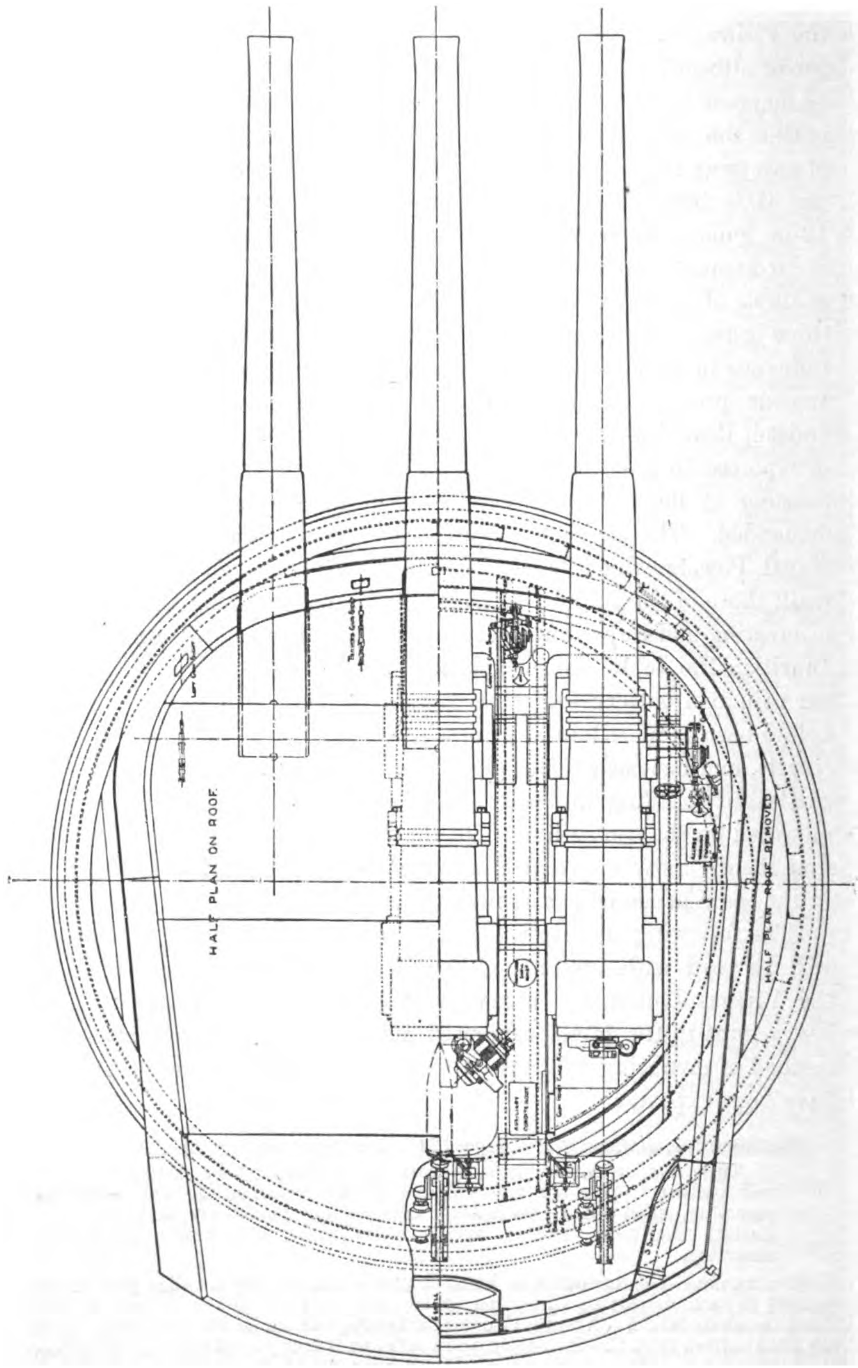
Triple mounting for heavy guns.

The mounting, as illustrated on pages 334, 335 and 336, consists of the following:—

Turntable structure; turning gear, gun-mountings, consisting of slides and carriages; pressure and exhaust piping attached to the revolving structure, shell room machinery, transporting machinery and hoists for loading the guns, leather apron; voice pipes, etc., and a shield and structure.

Turntable.—The turntable is built of plates and angles, a roller path being secured to its underside on which the rollers, when in position, have a true bearing along its whole length. A working chamber is attached under the turntable. In it the ammunition from the shell-room and magazine is transferred to the gun-loading (eccentric) hoist. The working chamber is built up of steel plates and angles; openings are provided for access to roller path, clip ring, rack, etc.

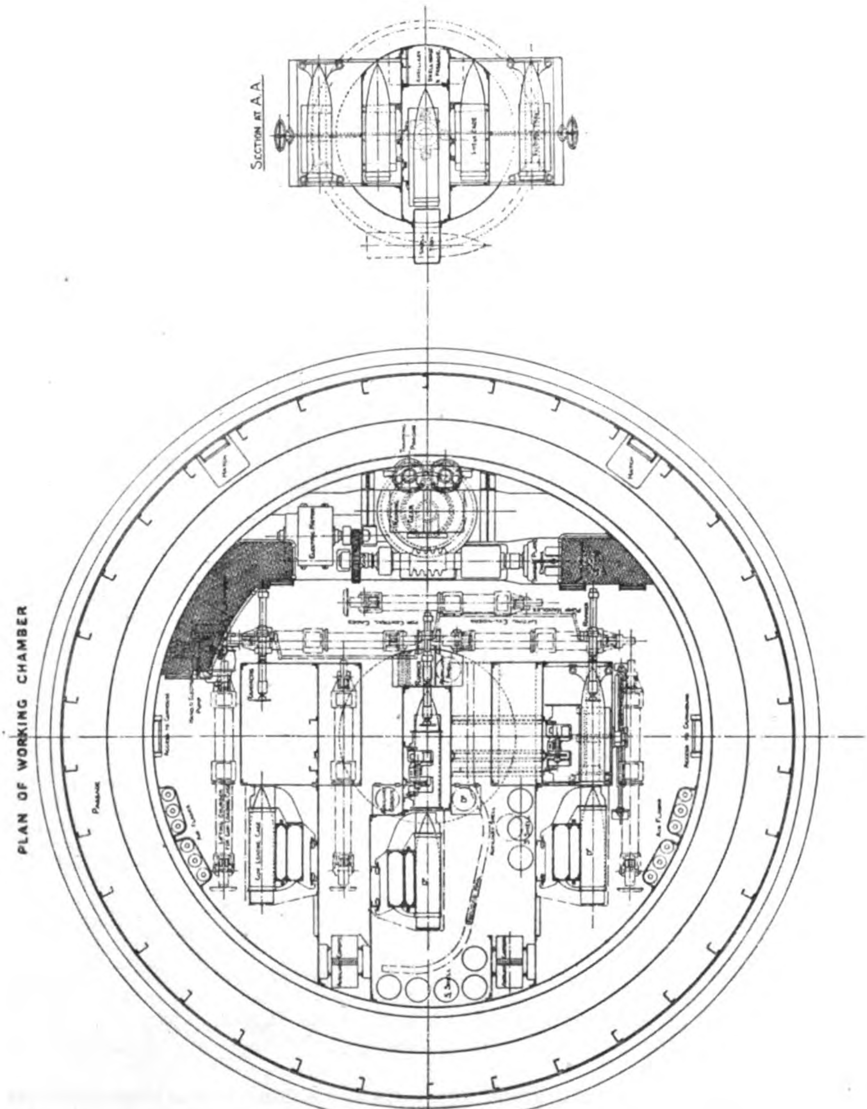
Ammunition Trunks.—An ammunition trunk is attached to the working chamber, and revolves concentric to the roller path; it is built of plates and angles and divided



ARMSTRONG TRIPLE MOUNTING FOR HEAVY GUNS.
Plan of Turret.

internally into spaces for auxiliary shell and powder hoists, central ammunition hoists, and a passage between the working chamber and the lower working spaces.

LIVE ROLLER RINGS, ETC.—Rollers and a live roller ring are provided for carrying the weight of the revolving structure; clips are also provided to limit the vertical movement of the mounting when the guns are fired.

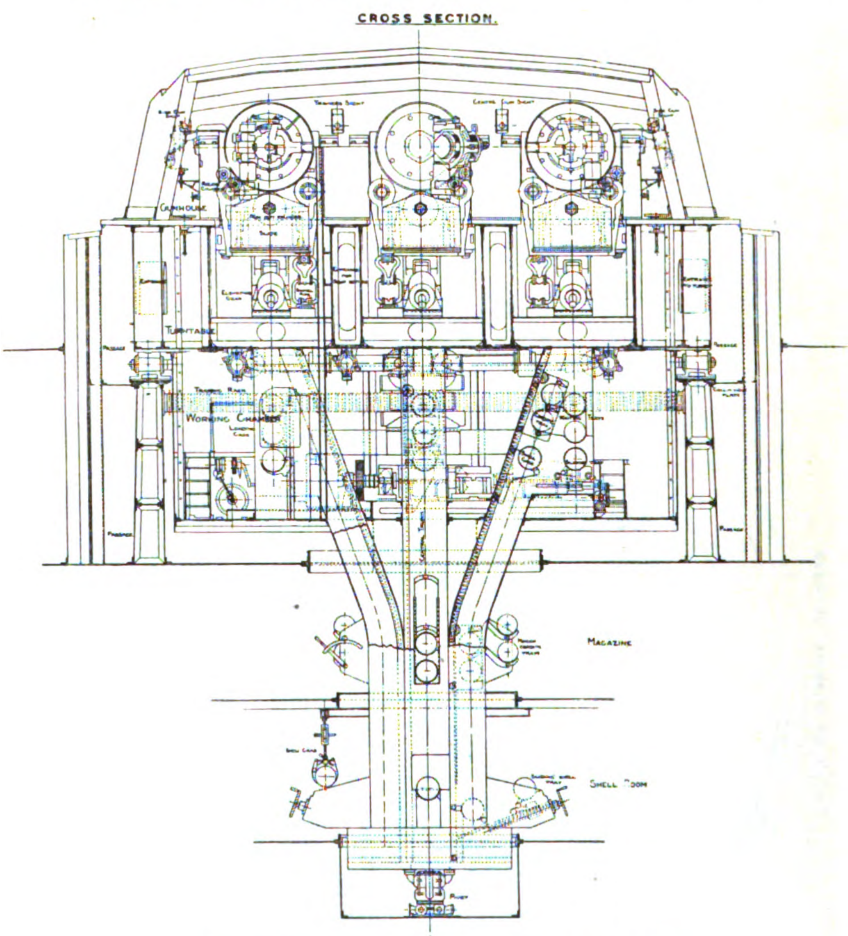


ARMSTRONG TRIPLE MOUNTING FOR HEAVY GUNS.
Plan of Working Chamber.

LOWER ROLLER PATH.—The lower roller path is made of cast steel, seated on supports built into the ship to receive them. Both the upper and lower roller paths are made in sections, and provision is made for removing any roller without lifting the turntable.

Turning Gear.—A swash plate engine is provided for rotating the turntable. The engine is connected through suitable gearing to two pinions gearing with a rack fixed to the support for the lower roller path. The shaft of the swash plate engine is clutched with a worm shaft, which gears into the worm wheel. With the guns in the run-out position, the engine is of sufficient power to rotate the turntable at a speed of one revolution in one minute. The engine is also capable of maintaining a steady slow speed of rotation of the turret at a rate of one revolution in ten hours.

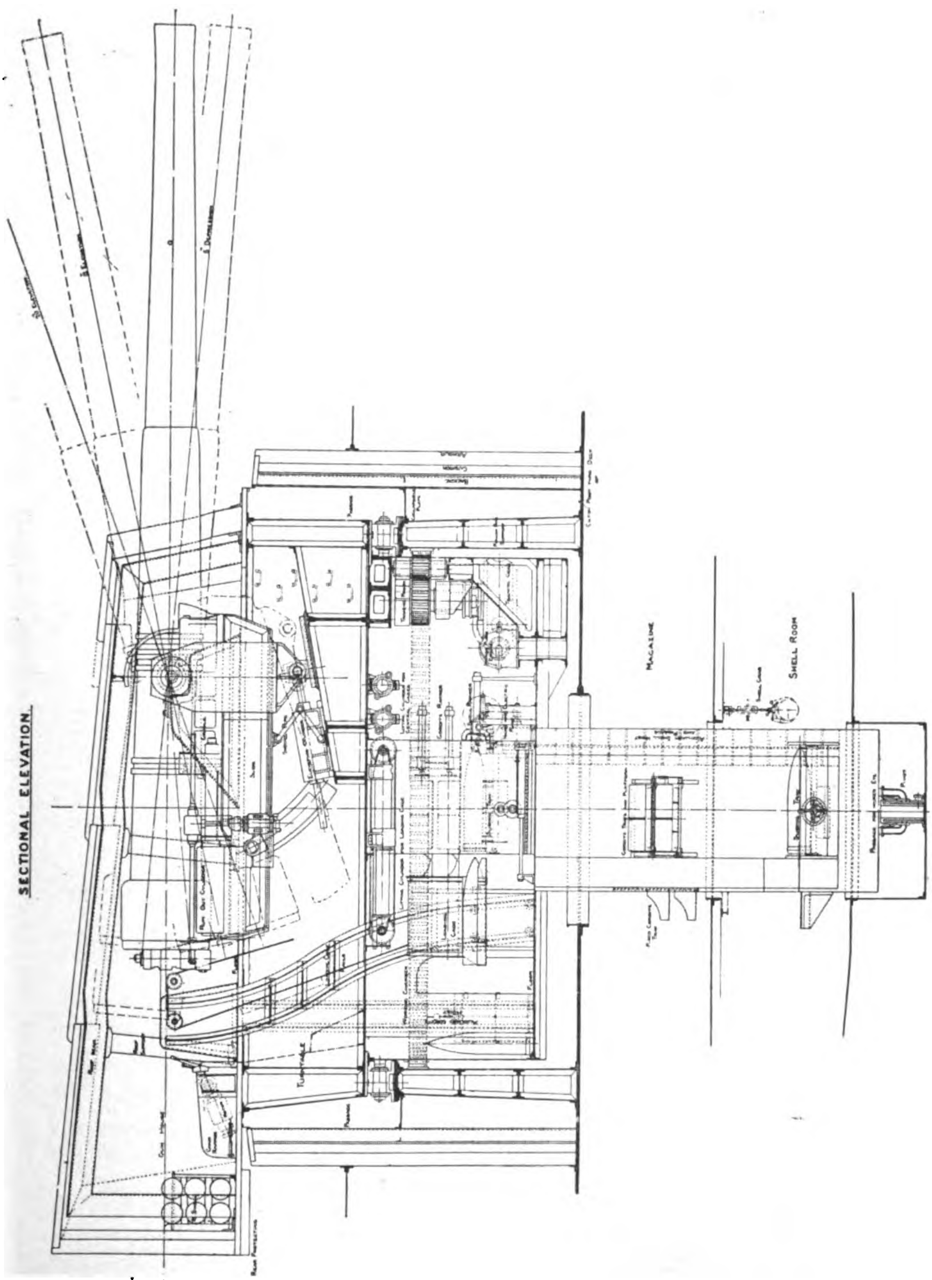
Alternative Training Gear is fitted.



Armstrong Triple Mounting for Heavy Guns.
Cross Section.

Training Cut-Off Control Gear.—Cams are fitted to the lower roller path supporting structure, and operate levers fitted to the revolving structure. The levers are connected to hydraulic throttle valves through which the pressure supply passes to the training engine. When the turret is trained to its extreme angle, or to a danger zone, the levers engage with the fixed cams, and thereby close the throttle valves through which the pressure passes to the engine, thus stopping the engine and bringing the turret to rest.

Hand Securing Bolts.—Hand securing bolts are provided for securing the turntable in its housed position. Levers and ratchets are fitted for working the bolts.



ARMSTRONG TRIPLE MOUNTING FOR HEAVY GUNS.

Sectional Elevation.

Gun Cradles.—The gun cradles are of steel, the guns being secured to them by means of thrust grooves and collars. The cradles are also provided with fittings for attachment to the recoil and run in and out cylinders.

Recoil Gear.—Recoil gear is provided, and consists of two cylinders attached to the slide beam.

Running In and Out Control Gear.—One run in and out cylinder is provided. Provision is made for removing the piston-rod and bye-pass valve with the gun in position.

Bye-Pass Valve.—A bye-pass valve is provided. Suitable valves and gear are provided to control the gun carriages, when they are run in or out, so that no damage is done by the movements being too violent.

Leakage Pump.—A leakage pump is provided and is attached to the slide. It is to make good automatically any leakage from the recoil cylinders. An indicator shows when the cylinders are full. An operating lever is provided for working the pump by hand.

Gun Slides.—The gun slides are constructed of steel forgings, plates, and angles. Trunnion checks are attached to each slide.

Trunnion Bearings.—Trunnion bearings are attached to brackets fixed to the floor-plate of the gunhouse, and carry the pivot pins on which the slide rests. Fixed hydraulic jacks are provided to lift the gun and carriage in order to remove the pivot pins for examination.

Pivot Pins.—Hollow forged steel pivot pins are attached to the trunnion brackets to carry the gun slides.

Rammers.—Hydraulic rammers of the latest Elswick design are provided. They are controlled by a valve, conveniently placed, and interlocked with their respective cages, so that they cannot be worked unless the cages are in the loading position.

Elevating Cylinders.—Elevating cylinders, connected by sliding blocks to the elevating bracket attached to the slide, are provided for elevating the guns. The guns are independently elevated and depressed by hydraulic power, controlled by valves in the sighting position. The guns are capable of an elevation of 20 degrees, and a depression of 5 degrees given to them. The time taken from maximum depression to maximum elevation is 7 seconds with the gun in the run-out position. Control gear is provided to prevent the guns fouling any obstruction on the deck when they are being trained. A graduated elevating arc is fitted to each slide, with a pointer fixed to the turn-table, so that the guns may be laid from each other in the event of damage to any sight.

Auxiliary Pump.—A pump worked by hand and by an electric motor is provided to give pressure in emergencies.

Gun Clearing Apparatus.—Each gun is provided with both air blast gear and hydraulic squirts for clearing the gun bores of gas and smoke, and delivering a spray of water on the mushroom heads of the breech screws and in the gun chambers. The air blast gear is worked automatically by the breech screw, and effectively ejects the gases through the muzzles of the guns after firing, and keeps the turrets entirely clear of gas or smoke.

Firing Gear.—The firing gear is electric. Firing triggers are attached to the elevating levers so that the gunlayer can elevate and fire without moving his hand. Under ordinary circumstances a gunlayer elevates and fires a right gun from the right-hand sighting position, another elevates and fires a left gun from the left-hand sighting position, while a third elevates and fires the centre gun from the centre sighting position. The turret trainer trains the turret and keeps his sight on the target from the left centre sighting position. Danger zone gear is fitted to render it impossible to fire the guns electrically when they are in a position whence their fire would endanger ship fittings or other guns.

Percussion Firing Gear.—Alternative percussion firing gear is fitted for use in emergencies when the electric firing gear is disabled.

Alternative Battery.—An alternative battery is provided of sufficient voltage to give the necessary current to fire the guns in case of the motor generator failing.

Auxiliary Firing Gear.—An auxiliary firing circuit, consisting of a special fixed pistol and permanent leads, is provided.

Automatic Ready Switch.—To each gun there is provided a ready position switch. This switch is so constructed that it can only be put into the ready position when the gun is out. That is to say, that under no condition is the electric

circuit complete to the primer or tube unless the gun is out in the firing position, and then only if the switch be placed by hand into the ready position. Directly the gun is fired and recoils, the switch automatically comes into the safe position.

NIGHT SIGHT CIRCUIT.—Night sight circuits are provided complete with lamps for illuminating the sight dials and the telescopes.

BREECH OPERATING GEAR.—This is worked by hydraulic or hand power. Interlocking gear is provided to prevent the ammunition cage being brought up to the gun should the breech not be open, but in order to save time, gear is provided to bring the cage into a waiting position clear of the gun, so that the cage can be immediately brought up into position as soon as the gun is run out and the breech opened.

SIGHTS.—The gun sights are of the latest Elswick type, of very solid construction, fitted with large dials plainly marked and moving with the minimum of leash between them and the telescopes. Means for correcting the sights for variations due to wear of the gun are provided. The sights are arranged so that a sight setter can adjust them without interfering with the gunlayer. The sights are rigidly attached to the trunnion arms on the gun slides.

PIVOT PIPE.—A pivot pipe is provided to lead the pressure into the revolving structure.

SHELL TRANSPORT.—Rails are fitted over the shell bays in the shell room and laid in a straight line close to a circular rail surrounding the trunk. For the purpose of lifting or lowering the shell there is a hydraulic cylinder with piston and piston-rod and wire rope purchase. From the shell room the projectiles are transported to the hoisting cage in the ammunition trunk, and raised by hydraulic power to the working chamber. They are then transferred by rammers to the loading cage and again raised by hydraulic power in line with the gun or to the waiting position. By this means there is no direct communication between the gun turret and the magazines, thus obviating the risk of explosive gases being carried down to the magazine.

LEATHER APRON.—A leather apron is provided to prevent water entering the barbette structure.

GUNHOUSE STRUCTURE.—The whole of the mounting and the gun's crew are protected by a shield of armour with a roof of specially strong construction strongly supported by beams and pillars. The projecting rear floor-plate is protected beneath by armour.

Before dealing with the actual developments which have been made in regard to lighter guns in armoured vessels, some notes by a well-known artillery expert on the relative importance of primary and secondary batteries, on the work to be done by the latter, and the type of gun best suited for doing it, are appended, and will be read with interest:—

"The tactical value of the secondary armament of a battleship is apt to be overshadowed by the importance of her heavy guns. Many look upon these smaller guns as something to be hidden away in any odd corner which may happen to be vacant, or, at best, as a necessary evil to worry the ship-designer. No doubt, when the main armament is properly disposed of, difficulties arise as to the positions available, in the necessarily restricted space for the secondary armament, from which the development of its full fire value may be obtained. This subject has, however, assumed such prominence that it is now considered of almost equal importance to the placing of the main armament. Secondary batteries.

"Even as regards the positions for the heavy guns, the opinions of those best able to judge have not by any means been unanimous. At one time, concentration fore and aft was demanded, so long as the

broadside fire was not unduly restricted; now, however, every effort is made to augment the broadside power by ranging the turrets along the centre-line of the ship, and this naturally curtails the intensity of fire fore and aft.

"Again, the popularity, or otherwise, of the triple and quadruple turret is a factor not be neglected; and although opinion in England is more or less averse to these systems, they find many advocates abroad, especially amongst naval designers, owing to the fewer openings necessary in the decks to accommodate the full number of heavy guns, which facilitates to some extent the designer's work in finding suitable positions for the secondary armament.

Attack of armour.

"Improvements recently made in the resistance of armour render the latest type of ships still less vulnerable than were the older vessels armoured with less resisting forms of armour. It may consequently be conceded that the probability of perforating the thick belts of improved armour, even with the heaviest modern gun in the Service, is no greater than was found to be actually the case in the Russo-Japanese war, when no authenticated case of actual perforation of the armoured belt in either navy was established. It is admitted that this was due to the oblique targets which a manœuvring ship nearly always presents, and not to want of power of the guns, because there was an ample margin of perforating energy for direct hits; but if there is so little chance of perforation by the heavy guns, it is evident that the fire from smaller guns for that purpose would be absolutely wasted.

"The long ranges at which future actions, excepting during their closing phases, will in all probability be fought reduces still more the chances of direct hits; so that while it is imperative to provide special projectiles for the attack of armour, their number need not be great, and they should be restricted to the heavy guns, for two reasons, viz:—

(1) It is only with the heavy guns that there is a chance of piercing the enemy's armour, especially along vital parts of the ship —even at the shorter ranges possible during the final phases of an engagement, when the attacking ship could perhaps choose her own position.

(2) It is only with a heavy armour-piercing projectile containing a comparatively large bursting charge that a knock-out blow is possible. Besides, it is just at this time that the greatest concentration of fire from the secondary armament should be directed on the enemy's unarmoured or thinly protected structures, in order to overpower and completely silence their smaller guns, and thus render the task for the heavy guns of the attacking ship easier.

"For the heavy guns, therefore, there should be a fair proportion of efficient armour-piercing projectiles containing the largest possible bursting charge; the remainder should be of powerful high explosive types.

"For the secondary armament, nearly all the projectiles should be high explosive common shell, capable of bursting behind thin plating with great effect. If any armour-piercing shell are provided, they should be reserved only for use against inferior targets.

"Supposing that what has been stated above be admitted—*i.e.*, that only the heavy guns should be used for armour piercing as opportunities arise, and that to the secondary armament should be given the task of keeping down the fire of the enemy's smaller guns and harassing the movements of the crew generally, but especially of the gun crews—it follows that the smaller guns must be capable of firing a large number of rounds without giving the captain of the ship any anxiety as to his ability to continue their fire, either owing to rapid wear, and therefore a short life, or to a falling off in accuracy. However, for piercing thin plating at ranges of, say, 8000 yards, a moderate velocity only is required. We hope to be able to prove that length of life of the gun and the muzzle velocity are more or less inverse terms—that is to say, that the higher the muzzle velocity, the shorter will be the life of the gun, and the lower the velocity, the larger number of rounds will the gun be able to fire.

Life of the gun.

"To obtain a high muzzle velocity with a maximum life, it is necessary (a) to make the gun as long as possible; (b) to reduce the charge to a minimum, consistent with a moderate density of loading; but even with all our present available knowledge as regards the best form of chamber, gas check driving bands on the projectiles, etc., one must admit that the high velocity gun has but a short life comparatively. Some blame the powder, with the assertion that a pure nitro-cellulose variety would give a greater life value, because the temperature of combustion of these propellants is less per unit of weight than those containing nitro-glycerine; but the calories of heat developed are also less, and consequently a larger charge, which usually must be loaded at a high density, is necessary to obtain the same muzzle energy as the nitro-glycerine powder. Instances have occurred where the use of nitro-cellulose powder under these circumstances has increased the erosion instead of decreasing it. Moreover, such terrible disasters, fresh in the public mind, have occurred by the use of nitro-cellulose powder abroad, that it is hardly likely that anyone in England would contemplate its use.

"But let us examine the reasons for the opinion of some artillerists that nitro-cellulose is considerably less erosive than nitro-glycerine powders, and for this purpose we will take from Noble's published researches the data for a loading density 0·2, which will be rather less than that for maximum pressures in modern guns.

—	M.D. Cordite.	Nitro-Cellulose.
Volumes of total gases per gramme of explosive . .	913·5	934·0
Units of heat produced per gramme (water gaseous).	964·5	850·5
Temperature of explosion, C°.	3240	2815
Pressure in tons per square inch	15·45	13·80

Noble also shows that the temperature of explosion rises with the density, so that nitro-cellulose powders at high density may have great erosive action, especially when high density is combined with a large charge.

Propellants and erosion.

"It will be observed, from the tabulated results given above, that the nitro-cellulose powder possesses approximately only 90 per cent. of the energy of the M.D. cordite, and its use will entail an additional weight of charge of about 10 per cent. to give the same velocity as M.D. cordite. Now, the generally accepted theory of erosion is that the heated gases sweep off with each round fired a minute film of the interior surface of the gun; naturally, the thickness of this film will vary in accordance with the amount of the gases and the length of time they are in contact with each section of surface. It would, therefore, be expected that a long gun would wear more rapidly than a shorter one, because (1) a larger charge, or one at a high density, would probably be fired in order to obtain a high velocity; (2) the ignited gases might be in contact with the bore for a longer time, because a charge taking a longer time to burn would probably be used. The maximum amount of wear always takes place at the extreme breech end of the rifling. Authorities are by no means agreed as to the actual melting point of steel; it is about 1300 deg. Centigrade, but varies to some extent with the amount of carbon; the difference is not important, and as the temperature of explosion of any powder is so much higher, these variations can be practically ignored.

"In any case, the conclusion arrived at, both by theory and practice, is that all high velocity guns wear rapidly, while those firing moderate velocities may last more than twice as long, and those giving low velocities, such as howitzers and field guns, can fire the largest number of rounds with the full charge.

"For the guns of the secondary armament the following conditions should apply:—

(1) The heaviest weight of projectile should be fired consistent with rapid and convenient handling.
(2) A rapid rate of fire should be possible.
(3) Accuracy at long ranges of, say, 9000 yards should be assured.
(4) A remaining velocity which will enable the common shell to perforate easily 2-in. plating at this range.
(5) A really efficient high explosive shell is essential.

"The heaviest shell which is generally supposed to be the most convenient for rapid handling is one weighing about 100 lb., so that this fixes the calibre at 6 in., or thereabouts; and supposing only a 2-calibre radius of head for the projectile, as a sharper head would give better results—and we desire to take the worst view—then the following table will give a fair comparison of a high velocity gun with 2960 f.s. initial velocity, and a medium velocity gun of 2500 f.s. initial velocity:— Guns and projectiles.

Range.	yds.	3000		6000		9000	
Initial velocity	f.s.	2500	2960	2500	2960	2500	2960
Penetration, mild steel	in.	7·7	10·3	4·15	5·7	2·85	3·7
Danger zone, target 30 ft. high . .	yds.	257	300	67	96	28	38

"The approximate range for the usual maximum elevation of 15 degree allowed by naval mountings is 11,000 yards and 12,800 yards for the medium and high velocity guns respectively, while the distance of the visible horizon, when viewed from a point 30 ft. above the water-line, is 11,800 yards; the difficulty, therefore, of hitting even so large an object as a battleship at these long ranges is so great that no commander would allow any great expenditure of ammunition from his secondary armament until his objective was closer and the probability of hitting it far greater.

"For direct fire, the penetrations given in the above table show that both guns are quite equal to the task of perforating two inches of steel up to 9000 yards range, and that the difference between the danger zones at any range is certainly not sufficient to warrant the expenditure of so great an excess of energy. This deduction is accentuated if the well-known fact that a 45-calibre gun having a medium velocity is far more accurate than a 50-calibre giving a high velocity is taken into consideration.

"The life of the high velocity 50-calibre gun may be taken at about 900 full rounds, while that for the medium velocity gun would be approximately 2000. When high velocity guns are adopted, a large proportion of spare guns ought to be provided to meet demands for replacement of those worn out, while a far less number would suffice to replace casualties with guns of medium power. When it is realised that the Japanese achieved their victories in 1904 with a secondary armament of 6-in. guns, with far less initial velocity than that advocated above for the medium-power gun, there hardly seems need for further argument.

"But, naturally, it will be asked, why are high velocity guns for secondary armaments adopted? It is a difficult question to answer, but no doubt authorities have been influenced by the armour-piercing power, by the possibility of longer range, and the supposed admission of larger errors in elevation when sighting owing to the flat trajectory. The last-named argument is not strictly correct, because on a vertical target the same alteration in angular elevation will alter the point of impact by equal amounts for any initial velocity; moreover, the accuracy of the modern sighting apparatus may be considered to exclude this argument, so far as the sights are concerned; and the training which the sighting numbers undergo should practically exclude it with regard to the *personnel*. There remains only, therefore, the error admissible owing to the difference in length of the danger zone; this difference is comparatively unimportant, and has already been discussed above."

Anti-torpedo batteries.

For the present, the 6-in. gun marks the limit of size for the weapons which are being mounted in battleships and battle-cruisers in addition to the primary battery, and the remark which was made in the last issue of the *Naval Annual* to the effect that "there has not been in any country a return to the batteries of 9·2-in., 8-in., 7·5-in., or 6·7-in., which supplemented the smaller number of 12-in. guns in the primary batteries of pre-Dreadnought ships," still holds good. But while no Power has yet advanced beyond a 6-in. gun, several have added to the calibre or the number of the smaller guns formerly mounted in their battleships. Moreover, the method of distributing these guns and the attitude of designers towards their protection by armour is undergoing a change, so that, while their principal object is for use against an enemy's torpedo craft, they may also be utilised against larger vessels to supplement the fire of the bigger guns at ranges up to about 9000 yards—that is to say, ranges at which they can discharge effectively a larger number of projectiles per unit of time than the heavier weapons.

In the Dreadnought the anti-torpedo guns were 12-pdrs., and

placed in the open on the upper works entirely unprotected. In the Dreadnoughts and battle-cruisers following the Dreadnought, the anti-torpedo guns were increased in calibre to 4-in., but also without protection, and placed on the upper works. In the Dreadnoughts now under construction the anti-torpedo guns have been increased in calibre to 6-in., and placed behind armoured protection throughout. Whether any new principle of design is involved in the change from the sixteen 4-in. guns in the King George V. class to the twelve 6-in. guns in the Iron Duke class must be a matter of opinion. Considered only as the anti-torpedo armament, the increase of calibre may be said to have been demanded by the greater size and power of foreign torpedo craft and of the light cruisers which can fulfil the functions of torpedo craft. Considered on the other hand as an armament for use against other battleships, it must be admitted that it is comparatively weak for its purpose. The King Edwards mounted four 9·2-in. and ten 6-in. guns in their intermediate batteries, and earlier pre-Dreadnoughts as far back as the Majestics mounted twelve 6-in. guns. If the necessity for a secondary armament for fleet action had been admitted, therefore, ought not the great development since 1905 to have made essential a more numerous battery than the twelve 6-in. of the Iron Duke? It may be noted that although the introduction of a 6-in. gun into the design of the Iron Dukes is held by some naval authorities to mark them out as super-Dreadnoughts, the distinction was not admitted by the First Lord of the Admiralty in his Estimates speech on March 26th, wherein he grouped the vessels of the Orion class and their successors into a separate class of super-Dreadnoughts, solely by reason of the fact that they mounted a more powerful type of gun in their primary battery. There is no difference between the anti-torpedo armaments of the Hercules and the Orion, both consisting of sixteen 4-in. guns. It would seem, therefore, that the practice of the Admiralty is still to include only two calibres of guns in British battleships, these two being, in Lord Fisher's words, the smallest biggest gun and the biggest smallest gun. There have been increases in the calibre of the first-named from 12-in. to 13·5-in., and again to 15-in., because it is essential that the heavier gun must never be out-ranged. Allowing for this fact, the guns of the Queen Elizabeth may be said to be the smallest that could be relied upon to do the work required of them. As regards the lighter gun, in the early Dreadnoughts it was manifestly intended only to be used against torpedo attack, and though in later ships it may usurp other functions with success, that remains the essential object of its inclusion.

Super-Dreadnoughts.

Foreign navies are taking a similar line to the British in regard

to the smaller guns of their battleships or battle-cruisers. In France, the Normandie class will mount twenty-four 5-in. guns, or two more than the Courbet, France, and Bretagne types. In Russia, the Imperator Alexander III. and her two sister-ships will carry twenty 5·1-in. guns in place of the sixteen 4·7-in. guns of the Sevastopol class. In Italy, the change from the eighteen 4·7-in. guns of the Dante Alighieri to the sixteen 6-in. of the Andrea Doria and Duilio was noted last year, in the Dandolo and Morosini the number of 6-in. weapons is being increased to twenty. In Japan the Fuso will have sixteen 6-in. guns, as compared with the ten 6-in. guns of her predecessors of the Kawachi type. In America, the Pennyslvania will mount twenty-two 5-in. guns, or one more than the number in the Nevada and Texas classes. In the first two Brazilian battleships, Minas Geraes and Sao Paulo, the anti-torpedo armament consisted of twenty-two 4·7-in. guns, some placed in the open and some behind armour; but in the Rio de Janeiro, twenty 6-in. guns are carried, and in the Chilian Dreadnoughts there are sixteen 6-in. guns. In the Greek Dreadnought ordered in Germany, although the displacement is only about 19,000 tons, there will be twelve 6-in. guns, and in the Turkish Dreadnoughts sixteen 6-in. guns will be mounted. It should be noted that, throughout the whole course of these modifications, Japan and Russia, who were certainly in a position to know the value of these guns, have at no time gone in for smaller calibre than 4·7-in. Both in Japan and Russia all these anti-torpedo guns are placed behind good armoured protection. The calibre of the anti-torpedo gun is thus becoming very much alike in all navies, but the number mounted varies from the twelve weapons in the British Iron Duke class to the twenty-four of the French Normandie class. It would now appear to be the general practice to place these guns behind armour of about the same thickness as their calibre. The introduction of anti-torpedo guns of increasing calibre, and placed behind adequate armoured protection, has had a great influence in increasing the size and displacement of later vessels, and has entailed great increase in dimensions.

Foreign practice.

Naval gun-sights.

In modern secondary armament, great rapidity of fire and speed of manipulation are important aids to efficiency, but with these must be associated accurate and effective sighting arrangements. In this country probably no firm has done more to develop the gun-sights of naval artillery than the firm of Messrs. Vickers, Limited, and within the last three years it appears they have completely altered the system of sighting.

For a gunlayer to shoot with the greatest advantage, it is necessary that his position should be a comfortable and easy one, and

in order that he may have no unnecessary bodily exertion in maintaining the eye on the eye-piece of the telescope, the latter fitting is arranged with practically no movement at all. In the heavier type of the secondary armament—that is to say, the 6-in. mountings—the gunlayer is accommodated in a seat close up to the trunnions of the gun, and has the eye-piece of the telescope approximately on the centre of the trunnions of the gun. Thus, during the elevating of the mounting and following the target for the roll of the ship, there is absolutely no movement of the body of the gunlayer necessary. In the lighter type of the secondary armament, such as the 4-in. and 4·7-in. mountings, where the gunlayer occupies a standing position, the eye-piece of the telescope is situated on the centre of the sight trunnions, which are arranged on the spring case vertically above the trunnions of the gun. It will be readily seen that all the movement that will be necessary for the gunlayer will be due to the roll of the vessel, and, being so close to the trunnions of the gun, no undue exertion will take place on the part of the gunlayer. Further, in order to ensure the right- and left-hand sighting numbers—that is to say, the elevating and training numbers—sighting with telescopes which synchronise absolutely, the Vickers Company have evolved a sight which consists of a rigid frame which may elevate either on the trunnions of the gun or on trunnions formed on the spring case above the trunnions of the gun. This sight frame is elevated by one rack, situated on the left-hand side of the mounting. The telescopes may be either secured to this rigid frame by holders, in which case the whole frame is arranged to oscillate horizontally on a large pivot formed on a saddle-bracket in the centre of the gun, or they may be supported in independent holders swinging on pivots disposed outside the trunnions of the gun and coupled together for deflection only by a very rigid connecting bar.

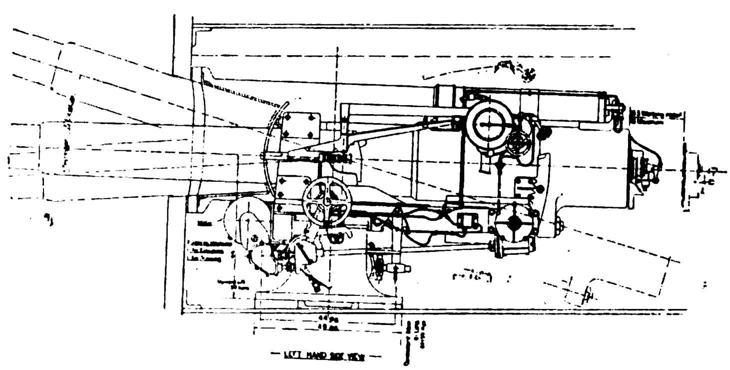
Gun-mountings. The system of continuous aiming now in use in all the principal navies of the world has brought about rapid and far-reaching changes in gun-mountings, especially in those worked by hand. The increase in the efficiency of a gun obtained by use of the continuous aiming system can only be maintained by greatly increased physical effort on the part of the gunlayer, and it goes without saying that the fatigue of the layer engendered by the new system would speedily discount any advantages gained thereby unless means were taken to counteract this tendency and reduce his exertions to their normal possible amount. The first step in this direction was the subdivision of duties in laying the gun, whereby, through the provision of duplicate cross-connected sights, one man manœuvred the gun in elevation, another in azimuth, and a third attended to the sight-

setting, all of which duties in the older mountings were undertaken by one man. This was followed by the provision of anti-friction gear in all the principal bearings in the mounting, at the trunnions, pedestal bearings, worm-thrust bearings, and so on.

Vickers electric-hydraulic control.

Some two years ago the Vickers firm introduced, for elevating and training purposes, an hydraulic control system electrically worked, and a number of their mountings have been fitted with this gear. The following is a description and illustration of a pedestal mounting for a 6-in. gun, with the addition of an electric motor and two universal transmission machines, one for the elevating and one for the training gear:—

The pedestal is of the usual form, made of forged steel and machined out to take the pivot stem. The carriage is of forged steel and in the form of a Y piece, recesses being formed in the side cheeks to accommodate the trunnion blocks, these latter being arranged so as to lock to the carriage in the front of the trunnions



VICKERS 6-IN. 50-CAL. GUN.
With Electric Elevating and Training Gear.

instead of to the rear, as is usual, this arrangement allowing of the trunnions being carried right through the carriage sides, and the ends turned to form the axis for the sight supports. The cradle is of the closed type and of circular section, the running out spring cases being situated above and the recoil cylinder below the gun.

The elevating gear is of the usual rack-and-pinion type, and is designed to be operated from a position in close proximity to the trunnions on the carriage. It is arranged so that the cradle may be elevated or depressed as required by either hand or electric power, the latter through a hydraulic controller or universal transmission machine, the change being made from one to the other by means of a clutch operated by a hand lever, and without the hand turning the hand-wheel or handle being removed. This elevating gear, when being electrically operated, is fitted with a hunting gear, this latter being so arranged that movement of the gun always follows the movement of hand-wheel, and the speed of elevating depends upon the speed of movement of the hand-wheel, so that when the hand-wheel on handle is stationary, the gun and cradle are stationary.

The training gear is of the usual type, consisting of a worm-wheel secured to the pedestal top by means of a powerful band clamp, and the usual worm and bevel gearing operated by means of a hand-wheel or hand-wheels situated in close proximity to the trunnions on the right-hand side of the mounting, and, like the elevating gear, it is also arranged to be worked either by hand or an electric power controller in a similar manner to that already described. Seats and foot-rests are provided for the elevating and training numbers instead of the usual platforms.

The shield is of the casemate type and fitted with a mantlet plate and hood in order to close up the gun port at all positions of the gun in elevation or depression.

The firing gear is of the usual type, and is operated either from pistol grips situated in close proximity to the hand-wheel, or else from a trigger contained within the handle itself. The sights are arranged with the telescopes well forward on the mounting, and the dials and hand-wheels to the rear, the eye-pieces of the telescopes being placed upon the trunnion centres. By this arrangement no movement of the eye-pieces takes place due to the elevating or depressing of the gun or sight, also the sight gaps in the shield are considerably reduced in size.

Coventry electric-hydraulic control.

Similarly, the Coventry Ordnance Works, in order to meet the same demand for power in hand-worked ordnance, has designed a gun-mounting in which auxiliary power is applied on the electrical-hydraulic transmission system, and this system under trial has shown itself convenient, flexible, and reliable. The system in its essentials consists of a source of power, such as an electric motor, placed on or near the mounting, on which power the gunlayer can draw to any extent he pleases up to its full capacity, or just enough to move the gun at the slowest desired speed.

This is made possible by the use of one of the several systems of variable hydraulic transmission gear now on the market. After careful consideration of several varieties of transmission gear, the Coventry Works have adopted the Hele-Shaw system as being the most suitable for their purpose. In common with other devices of the same nature, the Hele-Shaw pump is in principle a reversible variable throw-pump, but it is worked out in such a way as to eliminate entirely many of the features which require most attention in ordinary hydraulic mechanism. The rotary motor is similar in principle to the pump, but has a fixed throw. The method of controlling the gun is such that the gun can be moved by a step-by-step movement or at a steady rate of train, which rate is capable of being varied within wide limits depending on the relative movement of ship and target.

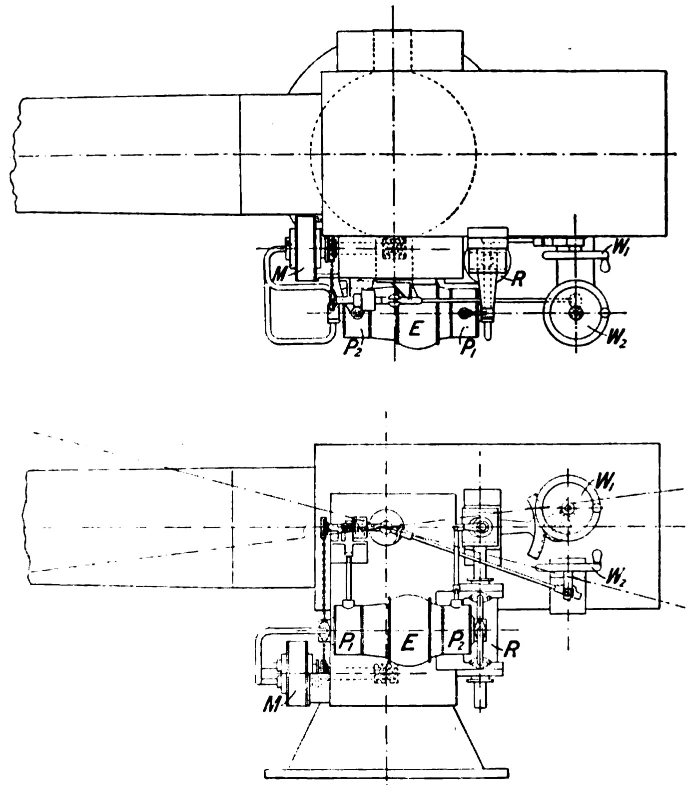
Hele-Shaw pump.

The application of the variative oil system to the manipulation of heavy guns has so far been only experimentally made in the case of a 6-in. gun, but it is claimed that owing to the increase in rapidity and ease of working over the manual system, the application will extend not only to 6-in. guns, but to 4-in. and even smaller guns. In regard to the question of cost, this system is also said to have a considerable advantage over other electric hydraulic systems in use. The actual plant for a 6-in. gun consists of a 1 H.P. electric motor, driving two small Hele-Shaw pumps, each of the latter being only 0·75 cubic inch capacity—that is to say, the smallest standard commercial size. One of these two pumps operates directly a special rotary double cam motor. This rotary motor, by means of a worm and worm-wheel, operates the training gear of the gun. The other pump directly operates the double-acting ram for elevating and depressing the gun. The ram is only 4 in. in diameter, and has a stroke of less than 12 in.

These diagrams show respectively, in elevation and plan, a mounting for the 6-in. gun. E is the electric motor, P_1 the training pump, P_2 the elevating pump, M the training motor, R the elevating ram cylinder. The distribution of the various pipes is clearly shown. The whole system for operating the gun weighs but little, and is very compact. The control is of the simplest description, the elevation and depression of the gun being effected by the movement down or up of the hand-wheel W_1, which acts on the stroke control of the pump P_1. The movement of the ram R shifts the gun on its trunnion, and also returns the pump control to central position.

The training of the gun is similarly brought about by hand-wheel W_2 acting on control of P_2. The movement of motor M also centralises control.

If instead of employing electric transmission from a central station on the ship or fort to operate a gun, it is desired to make the whole system self-contained, it is easy to arrange for a small internal combustion engine to take the place of the electric motor shown in the diagram; such system, for instance, can be employed in turret or fort to operate the largest guns, with the advantage that the necessary power to operate the whole cannot be cut off from the outside.



Compayne Transmission System Applied to 6-in. Gun as Arranged by the Coventry Ordnance Works, Ltd.

Williams-Janney variable speed gear.

Since the Williams-Janney variable speed gear was described in the *Naval Annual* for 1909, many alterations and improvements have been made in its construction. One of the principal alterations has been the substitution of roller bearings for the original ball bearings. The new bearing consists of a combination of conical rollers for taking the main or end thrust, and of cylindrical rollers for taking the radial load. The introduction of this new bearing has enabled the machine to be run continuously at very much higher pressures than formerly, thus permitting greater power to be transmitted and overcoming completely the chief difficulty in

the earlier type of machine. Another important feature is the modification in the universal joint, which is much simpler and stronger than the old design, and permits of a greater load-carrying capacity on account of the greater bearing surface available. Alterations have also been made in the spacing of the ports and sockets, which have made it possible to have the cylinders all of the same diameter. In this way all volumetric irregularities due to the action of the universal joint have been eliminated, with the result that the running of the machine is now quite uniform, even at the slowest creeping speeds.

In the case of machines the valve-plates of which were made of cast iron, no sign of wear has ever been discernible; gears with cast iron valve-plates have been in use for years, and the faces are in as good, or even better, condition to-day than when they were new. But in those cases where cast iron was not permissible, some slight trouble was formerly caused owing to the scoring of the material that was substituted for cast iron. Since, however, the adoption of a special hard phosphor bronze for this purpose, no instance of any wear on the faces of this part of the machine has ever been experienced, even after continuous operation under the most severe working conditions. The control has also been re-designed to meet the higher pressures now being used in the machine. The new type of control enables any number of turns to be made, from three-quarters of a turn upwards, in order to reverse the direction of the driven shaft of the machine from full speed forward to full speed in the reverse direction. The machine as now constructed is, without doubt, far superior to the type that was originally introduced into this country, and now leaves nothing to be desired as regards durability and efficiency.

In the last issue of the *Naval Annual*, some remarks upon power transmission and the chief machines which have been used for this purpose in the American Navy appear to have been capable of misconstruction. Although opportunities of installation were afforded to other systems, the Williams-Janney is the only hydraulic speed gear tried out on American battleships. The Waterbury Tool Company, the owners of the American patents, have supplied 500 of these gears to the United States Government, and they are constructing the complete outfit both for turret turning and gun elevating for the Nevada and Oklahoma, two of the latest ships in course of construction. In France the machine is manufactured by Messrs. Schneider, of Le Creusot, and several hundred machines have been supplied to the French Government for elevating and training ordnance, as well as for other purposes. In Russia the machine is manufactured by

the Putilov Works, of St. Petersburg, which have supplied several hundred machines to the Russian Navy. These gears are supplied to the Japanese Navy both by the Waterbury Tool Company and by Messrs. Vickers, and amongst the smaller navies the latest ships of Spain are being supplied with them. These facts should set at rest any unfavourable views regarding the use of this system of speed gear in men-of-war.

Torpedoes. With regard to torpedoes, nothing of sufficient interest has occurred during the past year to add to the remarks contained in the *Naval Annual* of 1912. The year, however, has been an extremely busy one with the manufacture and supply of torpedoes of the most approved pattern, and to meet the demand all the torpedo factories have added to their annual output. There is no reason to suppose that finality has been reached, but the approved types of last year have not been departed from.

Projectiles. The upward tendency in calibres of main armament still continues, and on all sides rumour is busy with trials of larger calibres. In this connection the group of fired shell shown in the illustration on the opposite page will be of interest, representing the heaviest modern armour-piercing shell in actual service, namely, 1660 lb., with a calibre of 14 in. The shells shown in the group have all perforated in an unbroken condition 12 in. of K.C. armour, with velocities down to 1517 f.s., which corresponds to a De Marre co-efficient of 1·4, a very creditable performance.

Fuses. The Coventry Ordnance Works have been engaged during the year in carrying out experiments with the Firth Patent Exploder for high explosive shell. This device allows of the detonator being fired in the normal position without danger of exploding the shell, so that a premature explosion in the gun is impossible. On striking, the detonator is exploded in a new position, and transmits the explosion to the exploder proper, and thus to the shell. It is also fitted with another device which prevents the exploder acting until at least 100 yards from the muzzle of the gun, and this distance can be varied to suit particular conditions.

Armour. The advantage, or otherwise, of belt *v.* deck armour, particularly for light cruisers or scouts, raises a debatable point. In the latest British cruisers or scouts, deck protection has practically given way to thin armoured side protection, and this protection is certainly not sufficient to keep out any armour-piercing shells of ordinary calibre guns, whereas, with ordinary side plating and a good protective deck, it is quite possible that such shells would pass through from side to side without inflicting any damage below water. The thin vertical side armour of the new cruisers or scouts might possibly be

instrumental in stopping the shells from torpedo craft, in the case where they do not strike normal to the surface, but it does not appear to be a very satisfactory arrangement. One point in favour of the side protection is that the material not being ordinary armour, but nickel steel, the whole of the material can be taken into strength calculations.

HADFIELD'S 14-IN. A.P. SHELL.

The application of Hadfield's "Era" cast steel armour to warship construction is increasingly in evidence from year to year, the combination of great toughness and freedom from splinters and the absence of joints conferred by its use making a strong appeal to the modern naval constructor. It also admits of armouring Cast steel armour.

many positions where protection would be impracticable by means of K.C. or rolled plates, while by admitting of a theoretically correct curvature and distribution of metal, the weight necessary to produce a given protective efficiency is considerably less than in the case of K.C. for such items as gun shields for secondary armament conning towers, etc.

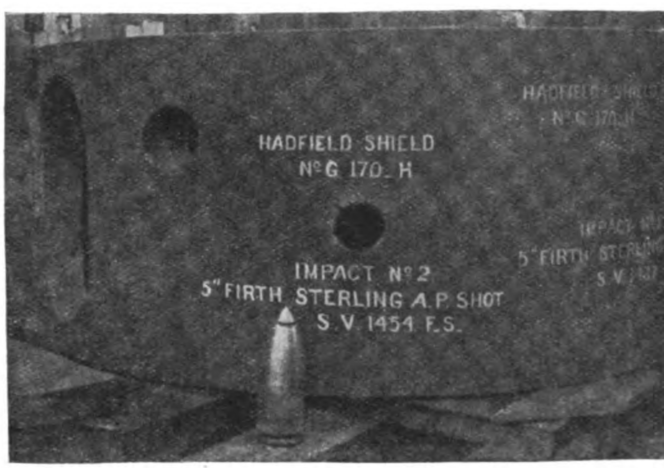
The resistance of this material is now established fairly definitely at a De Marre coefficient of from 1·1 to 1·2 against capped A.P. shell for normal fire, while its relative value rapidly increases with the angle of impact, becoming practically impenetrable at about 30 deg. or over. Some recent tests of a 5-in. "Era" cast steel shield are shown in the illustration on the next page, a curious fact being that the shell was in each case thrown back to a distance of about 100 ft. from the face of the shield. The striking velocities in this test correspond to a De Marre coefficient of 1·10, and none of the shell perforated the shield.

Resources of private yards.

As regards extension of plant and other developments in the private establishments for the production of warships and their equipment, in order to meet the varying and increasing demands of the Government, and to enable them to cope with any demand that may be made upon them, it is of interest to note that the First Lord, in his speech in Parliament on March 31st, said that it would be possible, if it were necessary, to begin during the present year at least four, and probably five, capital ships, in addition to the annual programme of five and the Malaya, making altogether ten, or, at the outside, eleven ships, and to complete them in the public and private yards within from twenty-four to thirty months. It would be possible to do this, he said, without arresting the progress of the five capital ships for foreign Governments now building in this country, and this programme of ten could be at once started and repeated annually with much less effort. Those who follow the enterprise of the various undertakings engaged in the provision of war material will quite appreciate the significance of this assurance, since it follows that, if the ships can be built, their armament and equipment can also be provided.

The Armstrong firm.

During the past year the development of the various works engaged in the provision of war material has been continuous, and in every department, not excluding the all-important branch of research and experimental work, there has been consistent progress. The Armstrong firm has made an important extension of its activities in the direction of a new shipyard at Walker, and during the year the assignment of the building of its first capital ship, the Malaya, has been made. In the information which he furnished to the Canadian



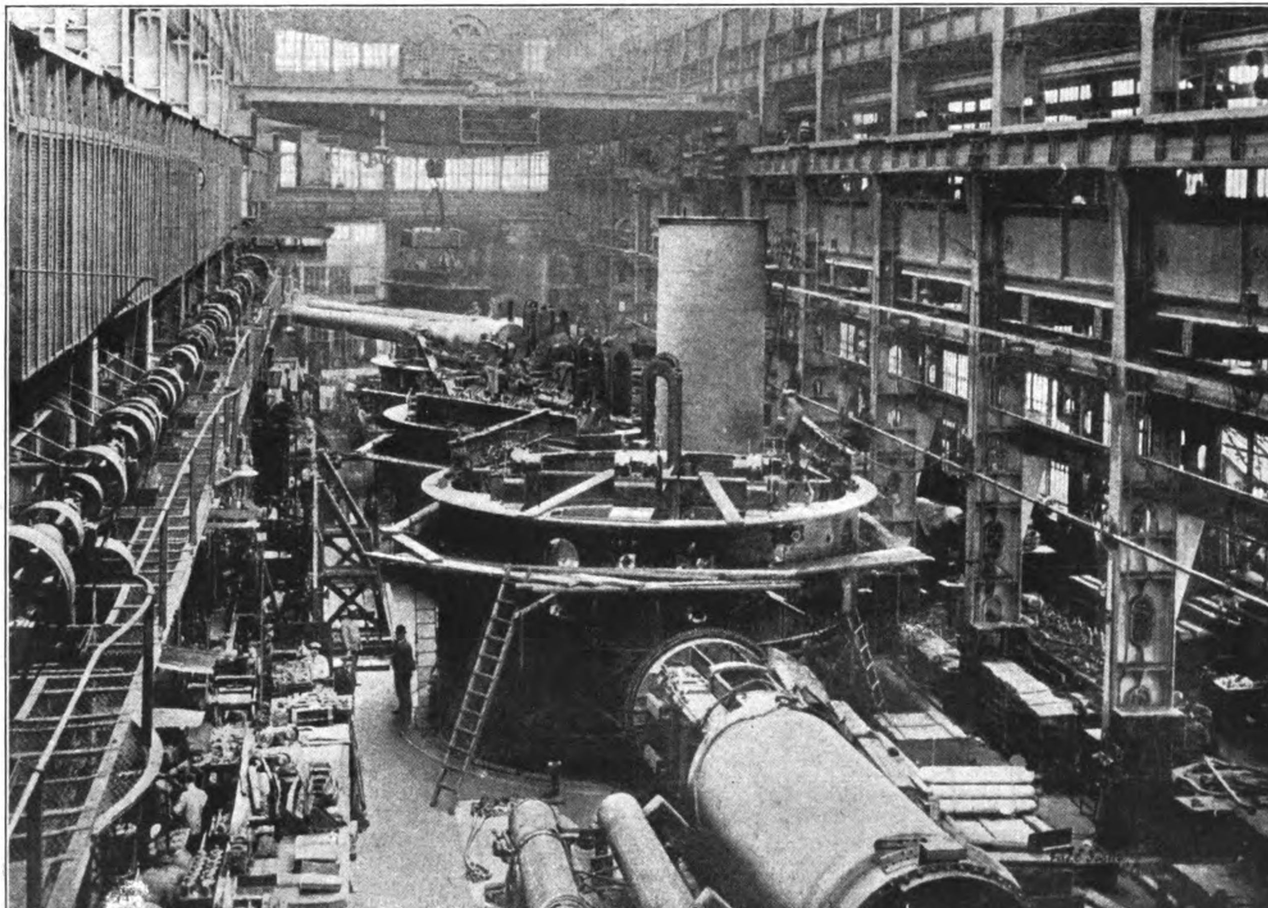
Hadfield's 5-in. "Era" Cast Steel Shields.
After tests.

2 A 2

Premier, Mr. Churchill touched upon the great cost and time involved in preparing this new yard, which, he said, is costing approximately three-quarters of a million pounds, and which had then (January, 1913) been two years in preparation, and would not be ready for laying down a ship for another six months. The illustrations on the following pages include a view of No. 7 shop at Elswick, in which the complete erection of the heavy gun-houses is undertaken. Three turrets are shown in various stages of completion over the pits, one being ready for lifting out by the big crane through the roof of the shop. In the foreground can be seen the ammunition hoist trunks which are erected underneath the turrets in the pits. Another illustration depicts an Elswick side-loading 21-in. torpedo tube erected in the testing-room for the purpose of proof. The side door is open, and the torpedo is in place ready for the door being closed which automatically loads the torpedo. The rear door is shown open, to give a better idea of the mechanism of the tube, but is only intended for repair purposes, and need never be used in the operation of the tube. It was hoped to illustrate, in addition, the process of gun-making and armour manufacture as carried on by the Vickers firm, but exigencies of time and space have obliged the postponement of the reproduction of the necessary photographs.

Beardmore & Co. Messrs. Beardmore & Co. have during the past year increased their capacity for the production of guns, gun-mountings, and armour. In regard to the first-named, they have received larger orders now that the authorities have satisfied themselves of the capabilities of the firm's gun factory at Parkhead, and a number of the heaviest calibre weapons, complete with their breech mechanism, are in hand. Additions have been made to the gun-shops and plant since the last issue of the *Naval Annual*. The 6-in. experimental mounting, which was fully described and illustrated in the *Naval Annual* of 1912, has undergone very prolonged trials by the Admiralty with complete success, the novel form of training gear having proved most efficient. As regards armour, no less than 7000 tons were put out by Messrs. Beardmore during 1912, and the present rate of production has advanced to 1000 tons a month. To meet increased requirements, two new melting furnaces have been added to the plant during the year, and are now being brought into use.

Coventry Ordnance Works. The gun-mountings for the Conqueror, which were designed and manufactured by the Coventry Ordnance Works, Limited, have now satisfactorily completed their trials. These mountings embody several novel features, particularly as regards the recoil arrangements. These latter, being of a new and improved design, required certain adjustments, which caused some delay in the handing over



ELSWICK TURRET-ERECTING SHOP.

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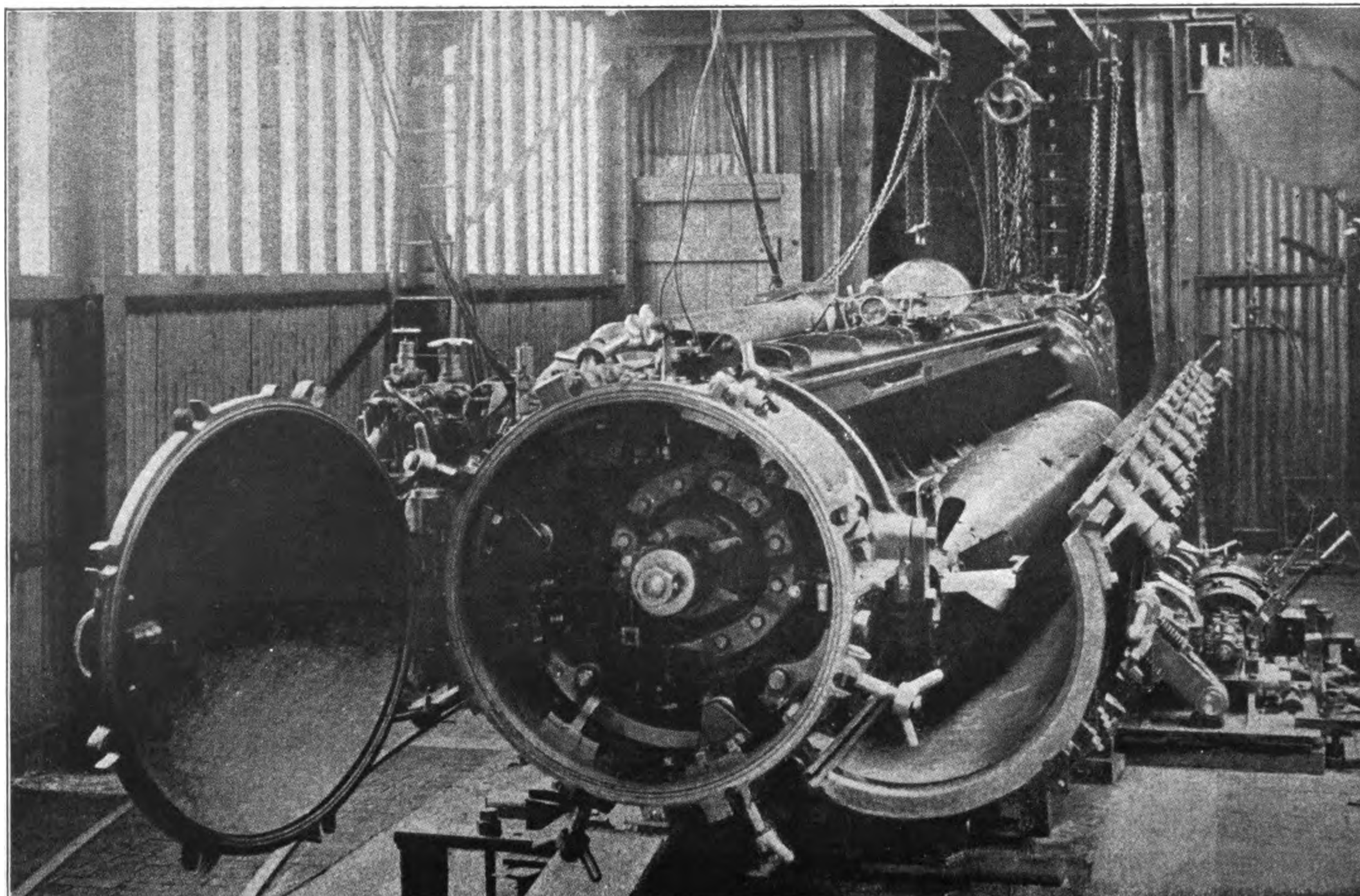
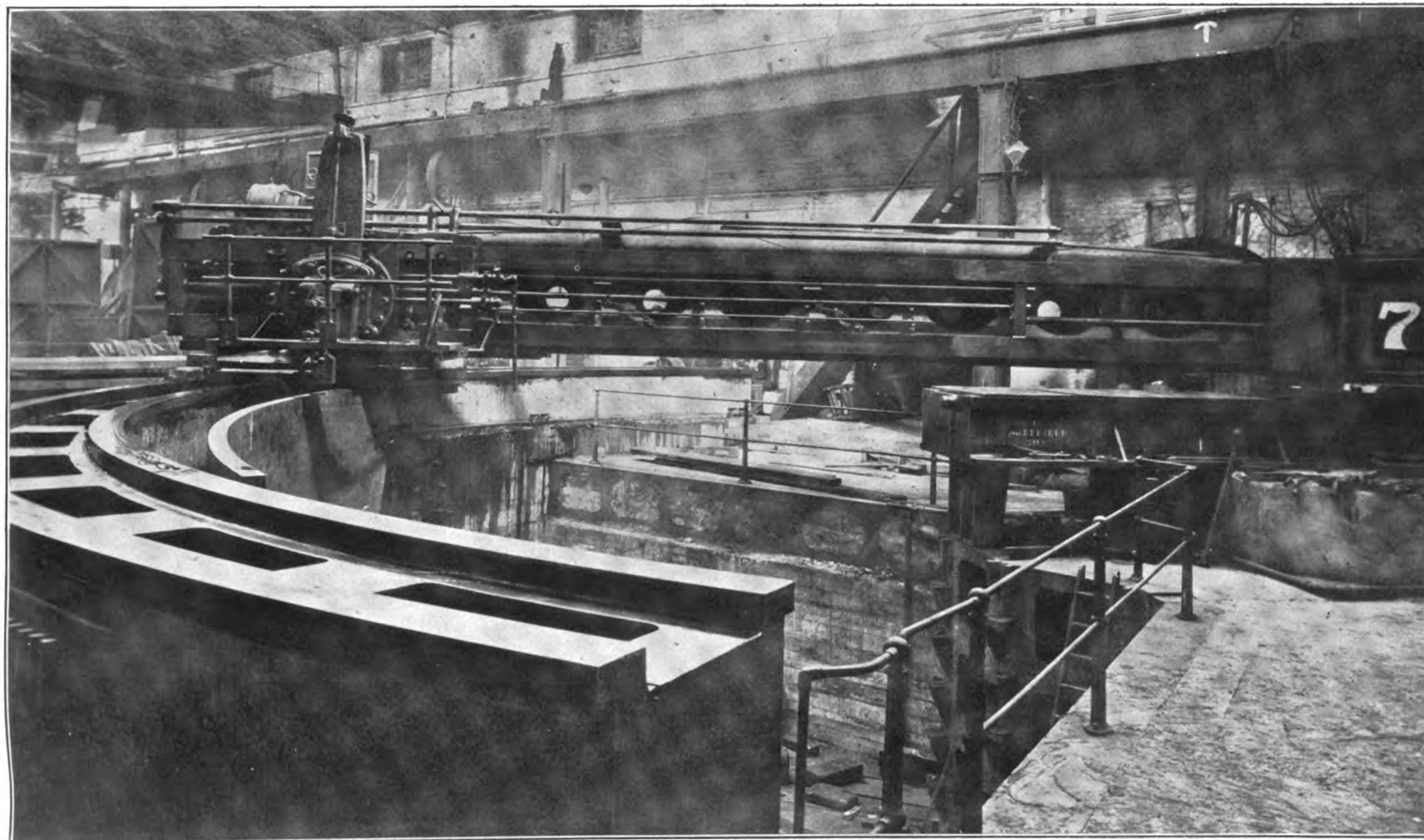
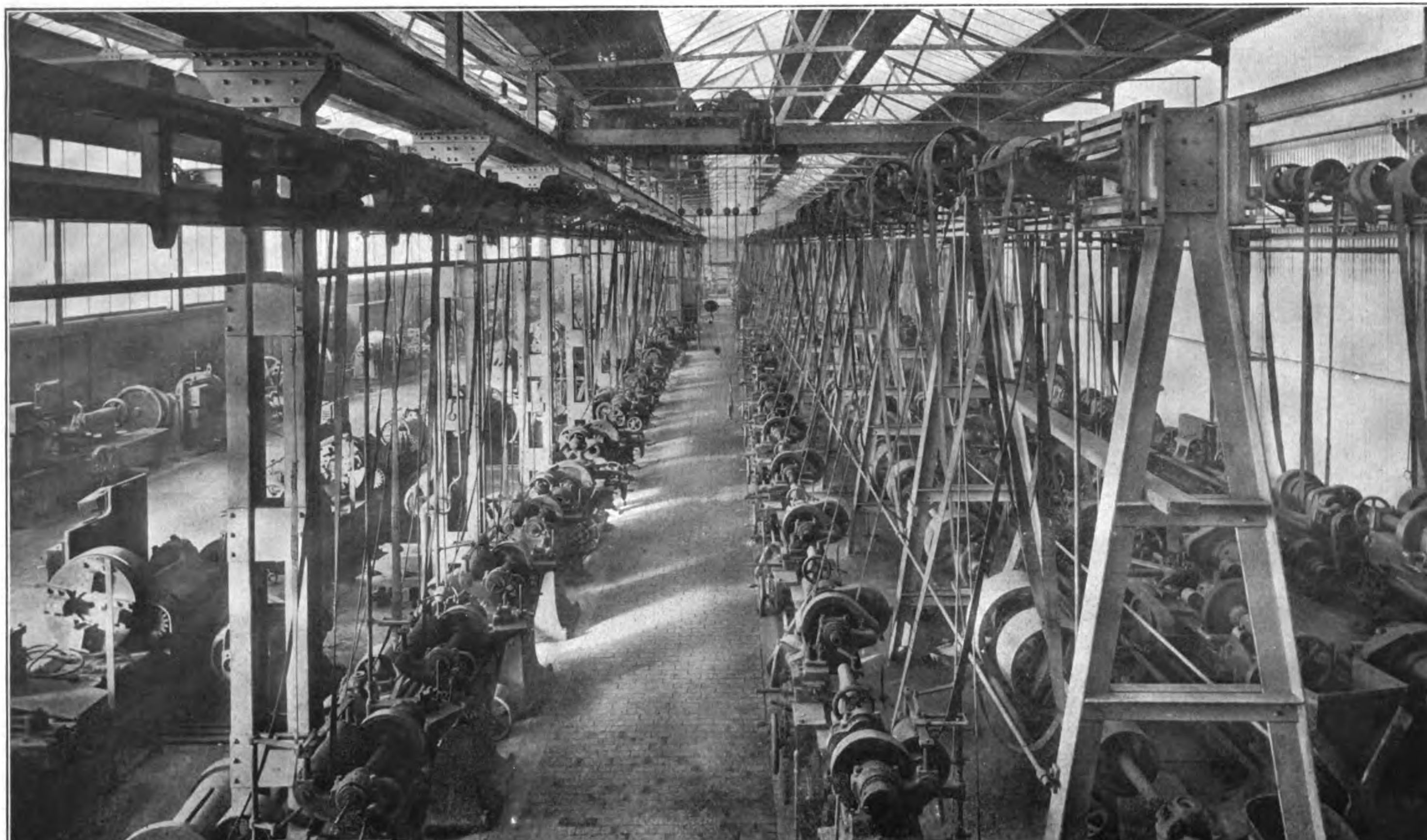


Elswick 21-in. Side-Loading Torpedo Tube.



Radial Armour-Planing Machine.
Messrs. Cammell Laird and Co., Ltd.



Shell Department Machine Shop.
Messrs. Cammell Laird and Co., Ltd.

of the ship. The gun-mountings for the Ajax and Benbow to a design of the Coventry Ordnance Works, Limited, are now being completed by that firm. Orders have been received by this Company during the year for Holmstrom breech mechanisms, which are now being manufactured in all calibres up to 14 in. The reports received from the ships in which this mechanism is fitted are of the most gratifying nature, and it seems probable that its adoption on a large scale by various Governments in the near future is assured.

The necessity for constant and heavy expenditure on new plant, to meet the latest demands of the naval authorities, is well illustrated by the provision of a new 12,000-ton bending-press for use in the armour-plate works of Messrs. Cammell Laird & Co. This huge press will be one of the largest, if not actually the largest, in the world. Among other developments in regard to plant at the same works, there may be mentioned an additional bogie-bottom furnace in the press shops for dealing with the largest forgings, such as gun-jackets, while further extensions of the steel-melting plant are in progress. On another page illustrations will be found of a radial planing-machine—which has also been recently erected, and which is of the type required for machining the curved edges of armour—as well as of the machine shop in the shell department. **Cammell Laird & Co.**

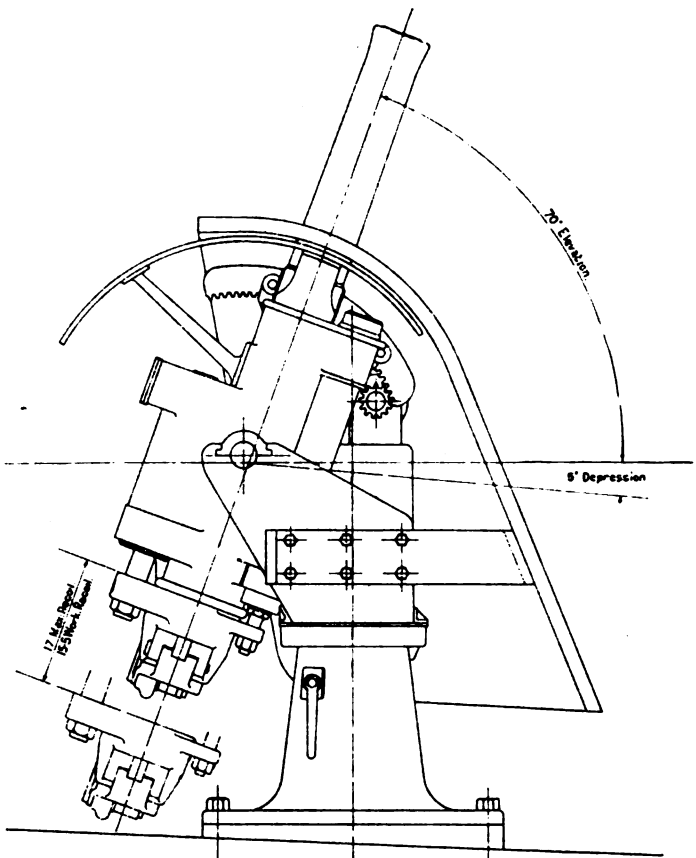
The growth in numbers and reliability of air-craft, and the development of opinion and belief in their coming usefulness for war purposes, continues to occupy the attention of designers and inventors. The First Lord of the Admiralty, in a recent speech, after describing the efforts made by the naval and military authorities to provide air-craft as adjuncts to their respective departments, referred to the arrangement made by the Secretary of State for War to distribute guns with improvised mountings capable of vertical fire at places of military significance, and added that a better and more powerful gun was being manufactured for the two Services, and would be ready towards the end of the autumn. In previous issues of the *Naval Annual*, the Vickers 3-pdr. and 4-in. guns, with their mountings; the Armstrong 3-in. semi-automatic gun and its mounting; and the Coventry Company's 12-pdr. gun and mounting, all arranged for high-angle firing against airships, were illustrated and described, as well as similar guns and mountings manufactured by the Krupp and Ehrhardt firms. **Air-craft weapons.**

All the British companies are continuing work of this nature. The Vickers Company have a pedestal mounting for the 4·7-in naval howitzer, which is illustrated on the next page. **Pedestal mounting for 4-7-in. howitzer.**

This mounting consists of the usual number of principal parts, viz.: pedestal, carriage, cradle, shield, and sighting gear. The pedestal is of the usual form, made of

forged steel and machined out to take the pivot stem. The carriage is of forged steel and in the form of a Y piece, the side cheeks being carried well back to take the cradle trunnions and fitted with cap squares. This arrangement allows of the gun being elevated to a maximum angle of 70 deg. The cradle is of the closed type and is made a gun-metal casting, the recoil cylinder, which is placed above the gun, being cast with it. The spring cases being secured one to either side below the gun.

The elevating gear is of the usual rack and pinion type, but is placed in front of



ESTIMATED WEIGHTS.

	Tons.	Cwts.	Qrs.	Lbs.
Gun and Mechanism		11	1	14
Mounting	2	13	3	0
Shield and Fittings	1	14	0	0
Total	4	19	0	14

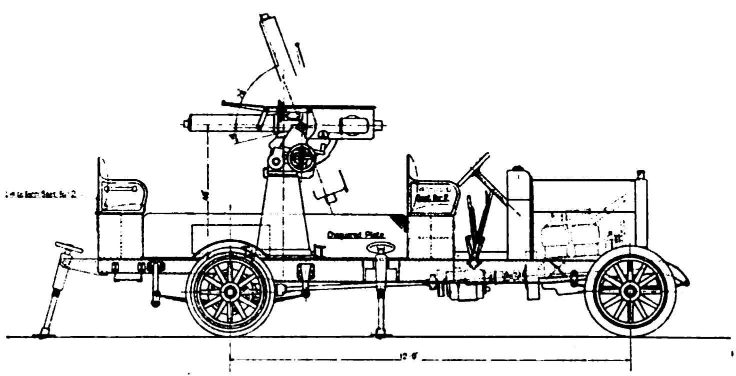
4·7-IN. NAVAL HOWITZER ON VICKERS PEDESTAL MOUNT FOR ANTI-AIR-CRAFT USE.

the trunnions instead of to the rear, as is usually done. The arc being secured to the cradle and the side bar being fixed in an almost vertical position to the forward part of the carriage. The gear being operated by means of a hand-wheel placed in close proximity to the trunnions. The training gear is of the usual type, consisting of a worm-wheel secured to the pedestal top by means of a powerful band clamp. It is operated by a large hand-wheel secured directly on to the rear end of the worm shaft. A body rest is provided.

The shield is of the upper deck type, with open back, and an additional mantlet

plate is provided in order to close up the gun port as much as possible at all positions of the gun in elevation or depression. The firing gear is of the mechanical type, operated by means of a hand lever carried by a bracket on the carriage and placed in close proximity to the hand-wheel. It is connected up to the mechanism by links and a lever. The arrangement of this gear is such that the position of the firing handle is constant at all angles of elevation. The sighting gear consists of an open and telescopic sight and also a goniometric sight, all three of which are placed close together and carried from the cradle trunnion on the left-hand side of the mounting.

For the type of mountings which has been specially adapted for high angle fire—that is to say, against a hostile air-craft—a parallel sighting arrangement has been devised, the centre around which this arrangement hinges being approximately at the eye of the gunlayer. Consequently it will be seen that there is practically no movement of the gunlayer in firing this piece from horizontal to 90 deg., except a slight movement of his head.



VICKERS 37-MM. AUTOMATIC GUN ON MOTOR-CAR.

Pompom on high-angle mounting.

The well-known pompom gun can be mounted either on a pedestal mounting arranged to allow for a total elevation of 80 deg., depression of 10 deg., and an all-round training, or on a motor chassis. In the former case the mounting is of the ordinary pedestal type, consisting of a carriage with elevating and training gear mounted on a conical pedestal. The elevating and training gears are both placed on the left-hand side of the gun, and are manipulated by one man, who also operates the trigger placed in the handle of the traversing hand-wheel. The sight is of the open sight pattern, and is carried on a link which elevates parallel to the gun and rotates about a point nearest the position of the eye when sighting. By this means the operator practically remains in the same position when sighting at high altitudes as when sighting horizontally.

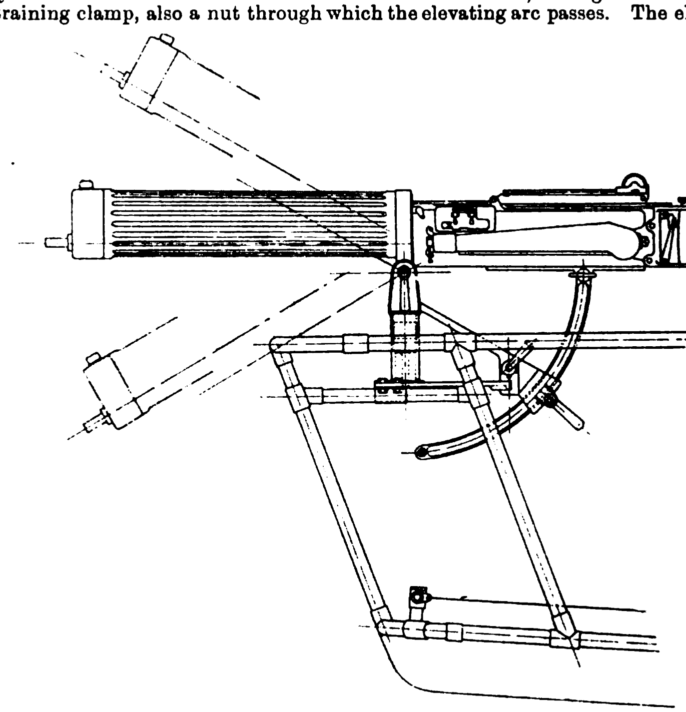
The accompanying drawing shows this mounting carried on a motor chassis. The chassis is arranged to carry the necessary ammunition underneath the seats, rear and front; in all, 500 rounds are carried. During firing the sides of the car fall down each side to

form platforms for the gunner, and the chassis is supported by three struts to take the weight off the springs.

Air-craft ordnance.

We also illustrate in the diagram below, and in the photographs reproduced on the opposite page, a Vickers mounting for an automatic gun to be used in a biplane.

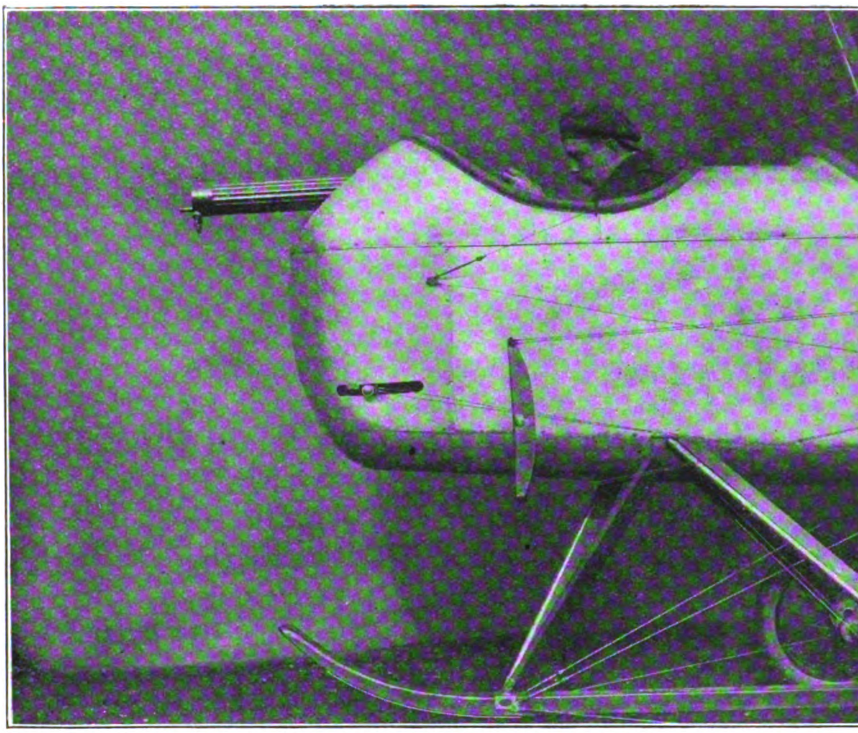
The mounting consists mainly of crosshead, socket, elevating arc, also base plate with training arc. The crosshead, which receives the gun, is pivoted on a socket bolted down to the base plate and a pivot stud, passing through the base plate, holds the crosshead down in position, at the same time permitting the crosshead to revolve freely on the socket. The crosshead has a rear extension, having at its lower end the training clamp, also a nut through which the elevating arc passes. The elevating



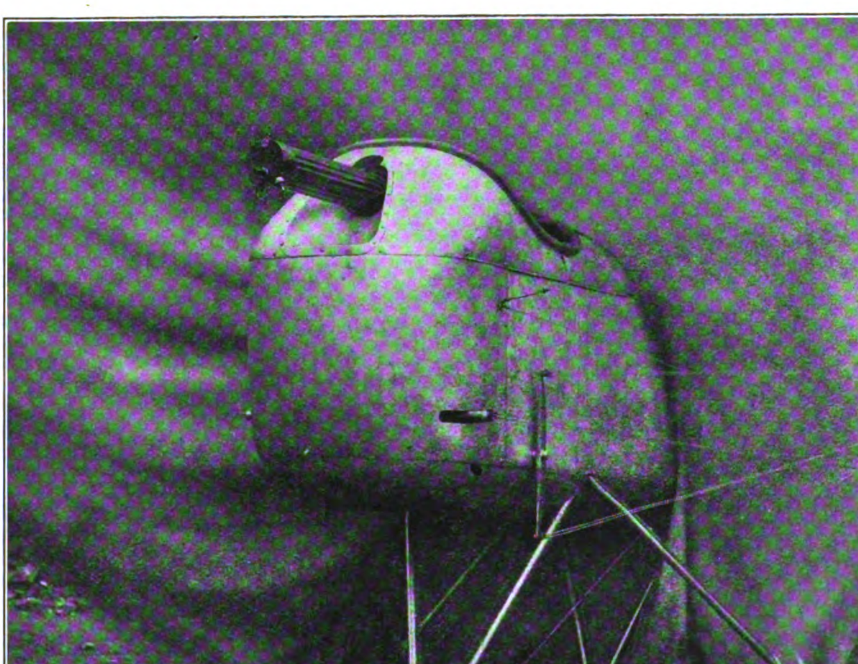
BIPLANE MOUNTING FOR VICKERS AUTOMATIC GUN.

arc is connected at its upper end to the gun by means of a joint pin, and at its lower end there is a stop which limits the depression of the gun. At any intermediate position the gun can be securely locked by means of a clamp which draws together the jaws of the nut above-mentioned, through which the elevating arc passes. The training clamp consists of a claw which is actuated by an eccentric bolt with a handle. When the handle is pushed down, the claw rises and thus securely locks the crosshead to the training arc in the desired position. The base plate is provided with clips and bolts for the purpose of attaching the mounting to the framework of the biplane.

The Coventry Company have also during the past year developed designs of guns and mountings specially for use against air-craft and also a gun for mounting in aircraft. The special features of the anti-aeroplane gun are a sight which is intended to allow for the speed of the aeroplane, and a predicting device which will make the setting of the shrapnel fuse, hitherto considered an almost insuperable



VICKERS AUTOMATIC GUN MOUNTED IN BIPLANE.
Side View.



VICKERS AUTOMATIC GUN MOUNTED IN BIPLANE.
Front View.

difficulty for this class of work, a matter of the greatest precision. The exact setting of the sight for range, elevation, and speed of target is controlled automatically by the range-finder.

Rifle calibre machine-guns.

The same firm have been working for the past year on a machine-gun of rifle calibre, and hope in a short time to be in a position to put forward a weapon capable of meeting all the requirements which this type of ordnance has now to fulfil. The demand for a machine-gun for mounting on aeroplanes has shown that the usual belt-feed gun has considerable disadvantages when so used, and that a gun provided with a simpler system of feed, such as magazines or chargers, and capable of being easily handled by one man, is more suitable. The Coventry gun is suited for this class of work, and the weight of the gun is a recommendation in its favour.

Messrs. Armstrong have devised systems of mounting guns in various kinds of air-craft, as well as special ship or coast battery mountings for the attack of hostile aeroplanes or airships. In most cases the guns are of standard types, as these are already designed and can be manufactured quickly, while it is undesirable to multiply types on shipboard. The pedestal mountings can be used in forts or afloat, either in big ships, destroyers, or even submarines, the mounting in the last-named being fixed to a disappearing platform. In every case, the important features are the provision of unlimited lateral range—in other words, an arc of training of 360 degrees; a range in altitude of at least 7000 yards at an angle of not less than 80 degrees; special telescopic sights, fitted to cope with the movements of a target rapidly changing both its elevation and direction; and shells having a wide area of destructive effect, fitted with specially sensitive fuses. Moreover, in order that something in the nature of spotting may be carried out by the sight-setters, the shells when fired leave a train of illuminating smoke behind them, indicating the course of flight, and enabling errors of direction and range to be corrected. All these *desiderata* have been satisfactorily met.

Mountings for air-craft.

Still more interesting are the mountings designed for use in air-craft. The guns to be carried in the fuselage of an hydro-aeroplane, or in the car of an airship, are, of course, to be used against other air-craft, and will fire high explosive or shrapnel shell, while it has been seriously suggested that something like chain-shot should be reintroduced, or canister, in which the pellets are tied together by barbed wire. A special type of mounting has been devised for placing on top of a rigid airship in order to meet the attack of aeroplanes flying overhead and dropping bombs from a higher altitude. Indeed in no other branch of the science of gunnery is there more definite sign of development and advance.

THE RADIAL INERTIA THEORY OF CAP ACTION.

THE following paper on this interesting subject has been kindly supplied to us by MAJOR A. B. H. CLERKE, late R.A. (of Messrs. Hadfield's, Ltd.):—

The action of a cap and its power of increasing the penetration of an armour-piercing shell have been the subject of many theories and speculations, and the following mathematical considerations are put forward with a view to throwing further light on the question.

It has been suggested that the actual failure of an armour-piercing shell, when such occurs, originates in the extreme point becoming detached and forming a wedge, which splits open the metal round the point, and that by successive or cumulative action of a similar nature the entire head of the shell becomes disintegrated. The writer has never been able to observe any practical confirmation of this action at velocities approaching those used for armour attack, although there appear to be grounds for supposing that it may happen to an unsupported point at such velocities as are obtained in a drop test.

Where no perforation occurs in a round fired against armour, the forward part of the head is usually found adhering to the damaged face of the plate, and is often detached by the shock of a succeeding round. In these cases the point is almost invariably found to be flattened, and the following is suggested as the probable explanation.

An uncapped shell which is overmatched by a plate fails, in the first instance, by the point being crushed in, and for this to occur the front of the shell must be deformed outwards. The nature of the stress set up is somewhat complex, but in the main the longitudinal stresses are compression, while the lateral stresses, both radial and circumferential, are tension. To illustrate the action of the impact of the point, we may imagine the shell composed of a number of longitudinal rods, tapered and curved to follow the outline of the shell and cemented together by an elastic substance. If such a body be struck on the point, the longitudinal members will be arched outwards, and if the elastic medium which binds them together is not sufficiently strong, it will be ruptured, and the longitudinal members bent and broken. This outward distortion takes an appreciable time to travel down the head of the shell, each portion being subjected to the wave of disturbance as it passes, and the most vulnerable part is the point which has to bear the brunt of the impact with less material to resist it. If the front end of the bundle of rods is bound more strongly or held together by an inward radial pressure, it will obviously be in a far better position to withstand the shock. To supply the radial pressure is the function of the cap.

For this purpose no great reliance can be placed upon the hoop tensions of the cap itself, as the force available from this source is comparatively small, the more so as the metal must become more or less plastic under the force of the impact. It will be seen from what follows that the radial inertia of the cap metal is a far larger factor in the case, and supplies a pressure of an order much more in keeping with the observed effect produced by the addition of a cap.

The plate itself is made up of a tough back, to which it owes its general resisting power and girder strength, and a hard rigid face, whose function is to distribute the blow delivered by the point of the shell over as large an area of tough back as possible, being for this purpose assisted by the intermediate stiff layer by which the hard face graduates into the tough back.

Penetration can only be effected by driving in a portion of this hard face into the comparatively yielding material behind, and success in this direction can in turn only follow the concentration of the blow over the smallest possible area. It is thus of supreme importance for the point of the shell to remain intact.

When a capped shell strikes such a plate, the front portion of the cap first flattens itself on the plate, arresting its forward motion and causing the interior portions of the cap to be in a state of considerable pressure and in intimate contact with the head of the shell. As the forward motion of the cap is checked, the head of the shell progressing through the mass of metal displaces it radially, and thus changes its direction of motion. This change of direction can only be accomplished by a definite force in a radial direction, the force representing the pressure existing between the surface of the shell head and the metal of the cap. If, then, we can estimate its radial acceleration, we can arrive at an idea of the radial component of the force necessary to cause that acceleration. The progress of the head of the shell through the mass of cap metal furnishes a means of measuring the radial acceleration acquired, and to produce which definite acceleration, a definite radial pressure must have existed during the period in which that acceleration has been acquired. There is, no doubt, also considerable pressure in the axial direction, but the radial component is the more important, and it is proposed to consider only this at present.

Taking as an example a cap of the rudimentary form shown in Fig. 1, let us consider the effect of the impact upon the various layers of cap metal, choosing, as a matter of convenience, discs of a thickness equal to the thickness of metal in front of the point which we will call h inches. We want to arrive at the degree of radial pressure which exists at the moment when the point of the shell

meets the plate, and h will therefore represent the travel of the shell during this period of acceleration, the time occupied being therefore $\frac{h}{12v}$ secs. where v is the striking velocity of the shell in feet per second. As h, in the type of cap shown, is taken as less than half an inch, this period of time at ordinary velocities will be in the neighbourhood of one fifty-thousandth of a second, and we can therefore, for practical purposes, assume the acceleration for this period to be uniform.

In view of the importance of the time element in matters of acceleration, this might at first sight be regarded as an unfair assumption, but a closer investigation will show that this is a reasonable approximation. Where acceleration arises as the result of force applied to a thick mass, no motion of the whole can take

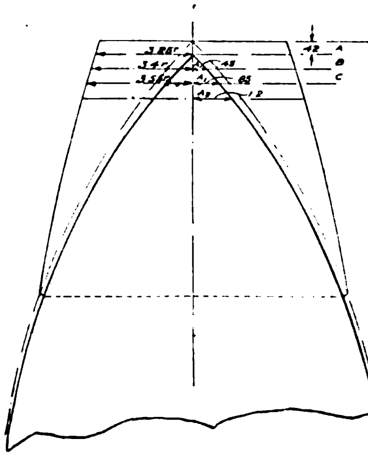


FIG. 1.

place until the first impulse has had time to penetrate the mass. In the material in question this impulse travels at about 17,000 ft. per second, and as the forward motion of the shell in the majority of practical problems is at about one-tenth to one-eighth of this velocity, the pressure necessary to overcome the inertia of the cap metal will be maintained throughout a forward travel equal to one-tenth to one-eighth of the radius of the cap.

If a, a_1, &c., be the radii in inches of the various sections of the shell head, and r, r_1, &c., be the radii in inches of the various sections of cap, and R, R_1, &c., the corresponding radii after the point of the shell has been immersed h inches. Then, considering disc A, the volume of metal before displacement $= \pi\ r^2\ h$ cubic inches. The volume of point immersed during a forward travel of h inches $= \frac{1}{3}\ \pi\ a^2\ h$ cubic inches. The volume of metal in disc A after

displacement caused by immersion of point $= \pi\, r^2 h + \frac{1}{3}\pi\, a^2 h$ cubic inches. Which will also $= \pi\, R^2 h$.

$\therefore\ \pi\, R^2 h = \pi\, r^2 h + \frac{1}{3}\pi\, a^2 h$; and $R^2 - r^2 = \frac{1}{3} a^2$; the radial displacement $R - r = \dfrac{\frac{1}{3} a^2}{R + r} = \dfrac{\frac{1}{3} a^2}{r + \sqrt{r^2 + \frac{a^2}{3}}}$ inches.

If striking velocity be v *f.s.* or $12\,v$ inches per second, this displacement takes place in $\dfrac{h}{12\,v}$ seconds, and, if uniform, the radial acceleration will be $\dfrac{2 \times 144\, v^2 \times \frac{1}{3} a^2}{h^2 (r + \sqrt{r^2 + \frac{1}{3} a^2})}$ inch seconds per second.

Now, if we consider the metal of the disc A divided into a number of infinitely thin concentric rings of thickness dr inches, the volume of each will be $2\,\pi\, r\, dr \times h$ cubic inches, and in a steel cap the weight of each will be $2\,\pi\, r\, dr \times h \times \cdot 28$ lb. The force required to produce the above acceleration will then be

$$\int_0^r \frac{2 \times 144\, v^2 \times \frac{1}{3} a^2 \times 2\,\pi\, r \times \cdot 28\, h}{h^2 (r + \sqrt{r^2 + \frac{1}{3} a^2}) \times 12 g \times 2240}\, dr \text{ tons}$$

$$= \frac{\cdot 14\ \pi\ v^2\ a^2}{2240\ h} \int_0^r \frac{r\, dr}{r + \sqrt{r^2 + \frac{1}{3} a^2}} \text{ tons}$$

$$= \frac{\cdot 14\ \pi\ v^2}{2240\ h} \left\{ (r^2 + \tfrac{1}{3} a^2)^{\frac{3}{2}} - r^3 - (\tfrac{1}{3} a^2)^{\frac{3}{2}} \right\} \text{ tons,}$$

which represents the *average* radial pressure which must exist over the surface of the point immersed in the front layer of cap metal. Similarly, the expression for the pressure in the next layer during the same first period of travel becomes

$$\frac{\cdot 14\ \pi\ v^2\ (a_1^2 + a_1\, a)}{2240\ h} \int_{\frac{a}{2}}^{r_1} \frac{r_1\, dr_1}{r_1 + \sqrt{r_1^2 + \frac{1}{3}(a_1^2 + a_1\, a)}} \text{ tons; or}$$

$$\frac{\cdot 14\ \pi\ v^2}{2240\ h} \left\{ \left(r_1^2 + \frac{a_1^2 + a_1\, a}{3} \right)^{\frac{3}{2}} - r_1^3 - \left(\frac{a^2}{4} + \frac{a_1^2 + a_1\, a}{3} \right)^{\frac{3}{2}} + \frac{a^3}{8} \right\} \text{ tons}$$

The general expression for the n^{th} layer being

$$\frac{\cdot 14\ \pi\ v^2}{2240\ h} \left[\left(r_1^2 + \frac{(a_n - a_{n-2})(a_n + a_{n-1} + a_{n-2})}{3} \right)^{\frac{3}{2}} - r_n^3 - \right.$$
$$\left. \left\{ \left(\frac{a_{n-1} + a_{n-2}}{2} \right)^2 + \frac{(a_n - a_{n-2})(a_n + a_{n-1} + a_{n-2})}{3} \right\}^{\frac{3}{2}} + \left(\frac{a_{n-1} + a_{n-2}}{2} \right)^3 \right] \text{ tons.}$$

It is not easy to say how far back along the cap the full radial displacement will take place, because the hinder portions of the cap are not at once arrested by the impact in front, and to some extent

follow the motion of the shell. They have eventually to be displaced outwards, but the time element is an uncertain quantity. The deformation of this portion of the cap, however, in itself must set up considerable pressure, and the loss of pressure due to the slower relative progress of the shell through the cap metal will probably be compensated to some extent by the hydraulic pressure set up throughout the mass of cap metal by the impact.

It is in translating the above expressions into actual figures that their importance is shown.

The following represent suitable figures for a large calibre capped shell:—

r = 3·25 in.		a = ·45 in.	
r_1 = 3·4 in.		a_1 = ·85 in.	
r_2 = 3·55 in.		a_2 =. 1·2 in.	
h = ·42 in.	and	v = (say) 1800 f.s.	

giving *average* radial pressures for these three layers of—

428 tons per sq. in. on the surface of the point immersed in disc A.
1000 " " " " " B.
1109 " " " " " C.

Here at once is seen the important part played by the inertia of the cap metal far outweighing any of its other properties, and lest any surprise should be felt as to the existence of such pressures in a comparatively weak material, it should be pointed out that from a dynamical point of view the nature of the material does not matter. We are only dealing with its mass, and to impart a given acceleration to a given mass requires a force of pressure of known quantity, even though the material becomes plastic or disintegrates under the pressure. The physical qualities of the material come into the question in two ways. It must be sufficiently ductile to stand a considerable amount of rapid extension without rupture, and it must be sufficiently stiff to enable the forward motion of the rear portions of the cap to be checked by the impact of the front portions in order to give the shell head the necessary relative motion through the mass of cap metal.

When the form of the equations is examined, it will be seen that the radial pressure varies as the square of the velocity, thus explaining the importance of velocity pure and simple in order to obtain effective cap action.

It will also be seen that the radial pressure varies inversely with the thickness of metal in front of the point, and herein lies the explanation of the value of the hollow cap.

The critical moment when support from the cap is needed is when the point of the shell meets the face of the plate, and the maximum advantage from the inertia of the cap metal exists when the point of the shell is commencing to move through the mass of cap metal and displace it radially. In order to obtain the maximum support at the critical moment, the point of the shell must meet the face of the plate when the shell is commencing to move through the cap, or, in other words, the thickness of metal, h, must be small, as is expressed by the equation.

Nearly every nation has now adopted, or is adopting, a long ogival cap of large radius of curvature on account of the greatly increased

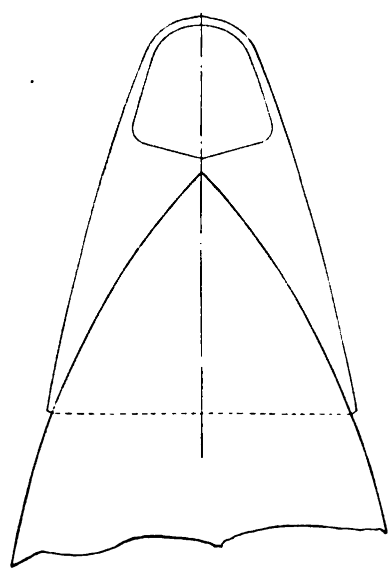


FIG. 2.

range thereby obtained. Such a cap, if made solid, must have a considerable thickness of metal in front of the point, and it is easy to understand that by the time the point of the shell meets the plate, the greater part of the cap metal will have been displaced outwards and its inertia resistance dissipated. It is also clear that the most effective portions of the cap are those that surround the point, and that therefore the greatest mass should be situated there, too much metal in front of the point being not only wasted but actually harmful.

The only way of combining these features with the long point necessary for good ranging is to have the front portion of the cap hollow. This theoretical reasoning is strikingly confirmed by the

great increase of efficiency displayed by the hollow cap as compared to the solid pattern.

A typical hollow cap is shown in Fig. 2, on opposite page, which embodies the essential features of massing the metal round the point of the head and keeping it thin in front of the point. It will be noticed that the hollow front joins the main portion of the cap by a shallow inverted cone, the deformation of which offers just sufficient resistance to arrest the forward motion of the main body of the cap while pressing it into intimate contact with the shell head.

In the foregoing mathematical investigation the further progress of the shell has not been traced, but might be subjected to a similar analysis, the question however being complicated by the difficulty of estimating how much of the earlier radial acceleration is absorbed by the resistance to stretching of the cap metal.

The chief function of the cap, however, is to enable the head of the shell to withstand the first shock of impact without rupture and on its success in this ordeal will depend the effect produced on the plate. In the one case there will be perforation by a solid body, well designed for the purpose, and in the other case the damage caused by the energy of the fragments.

FOREIGN POWERS.

Secrecy abroad.

Year by year it becomes more and more difficult to write anything really instructive concerning progress in matters of ordnance and armour in foreign countries. The secrecy that is thrown over the characteristics of ships is spread more heavily over their special equipments, and especially over everything that concerns the means of their offensive and defensive power. Where facts are not made known, rumour sometimes takes their place, and it is consequently necessary to receive some reports with great caution. The views of authorities upon points that arise are suggestive and instructive, and the best course to pursue in this foreign section is to deal, as far as is possible, with events of current interest as they are discussed. It is possible to say something about changes and progress in the United States Navy, and even to record some results attained with trial armour-plates, which are not accessible in the records of any other foreign nation. The introduction of a quadruple turret in the new French ships, and the great inquiry into the subject of the unstable naval powders, are the only subjects which can be dealt with in relation to the French Navy. German progress in armour production and the mounting of new ordnance cannot be recorded,

though the ballistic details of new guns can be given, as well as some account of the guns which are being produced for mounting in submarines, and which are presumably being mounted, or will be mounted, in German vessels of the class.

Wire-wound *v.* built-up guns.

"Nauticus" is never communicative on subjects connected with the German Navy, but there were interesting comments in the last volume upon some special features of modern developments. The gun was shown triumphant over the armour-plate, chiefly owing to increase of calibre. Therefore we are given to suppose that Germany, long content with the Krupp 11-in. gun, and now mounting the 12-in., is going further in that direction. One advantage which "Nauticus" pointed out was the increased power of the individual shot, both in penetration of armour and in destructive effect, combined with lesser initial velocity and a relatively shorter and lighter gun. There was also indicated the possibility of reducing gas-pressure, whereby the gun would be less subject to erosion, and its "life" might be prolonged. The Germans have always been inclined to depreciate the value of our wire-wound guns, but "Nauticus" thought that the bigger calibre gun would give us an advantage, because it is relatively shorter, and a wire-wound 45-calibre gun would have greater longitudinal rigidity than one of 50 calibres. "Nauticus" also found the value of the heavier calibre gun less influenced by atmospheric conditions, since wind and air pressure do not affect its projectile as they do the lighter one. Moreover, the possibility of attaining the same effect with a reduced number of rounds seemed to "Nauticus" to simplify the question of designing ships in regard to the mounting of their guns. He hazarded the surmise that, under the designation of 13·5-in. A., we were producing a 15-in. gun. The German critic, pursuing the question of heavier guns, saw an advantage in the fact that the armour-piercing shell can carry a much larger bursting charge without losing its perforating power. Thus the 15-in. armour-piercing shell will contain about the same bursting charge as the 12-in. high-explosive shell.

It has long been the practice of German ordnance experts to represent German guns as superior to British guns per unit of weight, and a comparison of ballistic tables provides them with some flattering conclusions. We are told that the power of the Krupp gun is almost constant in various large calibres with the unit of weight. With one kilogramme as a unit, it is, in the case of the 50-calibre 12-in., 366 mètre-kilos, and with the 40-calibre 15-in. it is 370. Far different, say the critics, is it with British guns, in which the 45-calibre 13·5-in. has a power per kilogramme of 277 mètre-kilos and the 50-calibre 12-in. of only 240. Again, the

British ·45-calibre 13·5-in. weighs 80 tons—the figure is not quite accurate—with energy of 22,150 mètre-tons, while the Krupp 15-in. weighs 73·9 tons, with energy of 27,330 mètre-tons. In the *Artilleristische Monatshefte*, November, 1912, General Rohne quoted these figures, and drew the attention to them of patriotic Germans, moved by unreasoning self-disparagement.

Discussing still the British wire-gun, "Nauticus" said that the vibration after firing was greater than in the built-up gun. The muzzle might droop even as much as 4·45 in., while the maximum with a built-up gun was 2·35 in. It was further alleged that even the heat of the sun would cause the wire-wound tube to curve, causing, perhaps, a deflection of two-sixteenths of a degree. "Nauticus"—whose remarks on such subjects we give without comment or correction—conjectured that such faults as he attributed to the wire-wound gun were not without influence in determining the advance to a larger calibre, with a relatively shorter tube. "Nauticus" did not refer to the great comparative ease with which British guns are re-tubed.

Triple turrets.

The critic, though he saw advantages in the system, did not like the triple turret. He said that the lateral movement of the turret would be greater when a side gun was fired than in the case of a double-gun turret. Even if guns were fired practically at the same time, with an interval of only one-hundredth of a second between them, it would be sufficient to cause lateral movement that would destroy the accuracy of the second shot. He remarked that for this reason, in the new Italian turrets, the middle gun was raised above the others, which are brought closer together. But he quoted the *Rivista Marittima* to the effect that, with three guns on one level, the turret will turn to the extent of 4 deg. when a lateral gun is fired, whereas the movement of a double turret would be 2·2 deg. But the Italian comment was made before the Dante Alighieri's trials, which are referred to below.

On the subject of director-firing, "Nauticus" wrote very guardedly, expressing no direct judgment, but setting advantages and possible disadvantages side by side.

The destructive effect of large-calibre ships' guns results from the impact and penetration of their capped armour-piercing projectiles, carrying a bursting charge of from 2½ to 4 per cent. of their weight, and the 12-in. gun is approximately equal to the attack of armour of the thickness of its own calibre up to 8000 mètres (8700 yards). Such was the view expressed by "Nauticus," but he referred also to an explosive shell carrying 8 per cent. of its weight of explosive and provided with a sensitive fuse. This would penetrate where it could

and spread as much destruction as possible, but he did not anticipate great effects against armour. This opinion was based upon American experiments, intended to represent the effect of the Isham shell. These trials have been described in the *Naval Annual.*

Projectiles. Some remarks followed upon the advantages which have resulted from the introduction of the pointed shell, whereby air resistance is greatly reduced. In the Krupp tables of 1908 the 50-calibre 11-in. shell, with an initial velocity of 975 mètres, was given a residual velocity of 701 mètres at 5000 mètres range, being a loss of 274 mètres; but a modern shell, at the same range, would have a residual velocity of 796 mètres, which is the velocity of the older type at 3100 mètres. The pointed projectile permits either a large increase of energy without great increase of erosive effect upon the gun, or the same energy with lesser initial velocity and reduced erosion.

Armour. With regard to armour, "Nauticus" had some remarks on the larger plates now produced, and the system of applying them to the ship's side with their greater length vertical, whereby only one range of armouring might be required. He drew attention to the efforts made in this country to effect a copper weld between armour-plates with the object of increasing resistance. In his view vanadium steel is too expensive to be brought into ordinary use, but he referred to the hopes entertained of obtaining good results by applying a thin coating of armour of special steel covering the main armour but with an inter-space, as a decapping device. Such plates he referred to as being 25 mm., or about 1 in. thick. The idea is to bring about the detonation of the shell, and to diminish its power against the thicker armour.

Anti-air-craft guns. Referring to a special department of ordnance work—that of anti-balloon guns—"Nauticus" said that they would soon be mounted in all warships. There will not be a duplication of guns, because the special guns will also be available for the other uses of guns of their calibre. These matters are referred to below under the head of "Germany."

A statement was appended to the armour and ordnance section of "Nauticus," in the previous volume, intended to show the relative total number of guns mounted in German and British ships launched within a period of ten years. In the decennial period up to 1912 the German guns of heavy calibre were stated to be in the proportion of 1 to 2·2 British guns, 1 to 2 of medium calibre guns, and 1 to 1·7 of guns of lesser calibre. If the same period be reckoned back from 1913, taking account of ships expected to be launched, the proportions are given by Gen. Rohne in the *Artilleristische Monatshefte,* as

follows: heavy guns 1 to 2·4, medium 1 to 2·4, small guns 1 to 1·6. We have not examined the facts upon which these proportions are based, but the practical abandonment of medium armaments after the building of the Dreadnought seems to suggest some doubt as to their precise significance.

UNITED STATES.

As is the case in other countries, the ordnance authorities of the United States are reticent in regard to recent advances, and Rear-Admiral Twining, Chief of the Bureau of Ordnance, in his Report, says that though many improvements have been made, the information is regarded as confidential. A great deal of work had been thrown upon the department by the organisation of the new Reserve Fleets, and much experimental work had been in progress, which gave confidence that many details of ordnance material had been improved.

The guns required for the New York, Texas, Oklahoma, Nevada, and the destroyers have been produced and are being completed by the Washington Navy Yard, the Watervliet Arsenal, the Bethlehem Steel Co., and the Midvale Steel Co. Modifications have been made in a number of 12-in., 8-in., 6-in., and 5-in. guns. Some fifty 8-in. and other larger guns, and more than 100 guns of calibre less than 8 in. have been relined and are to replace worn guns afloat. Conical lining has been definitely adopted, and in future this method will be used whenever practicable in the United States Navy. New guns.

An eccentric type of breech plug has been adopted for cartridge-case guns other than those having a sliding-wedge type of breech mechanism, and new mechanisms of the type are being fitted to all 3-in. 50-calibre Mark III. guns which are being issued to the Fleet.

The triple-turret mounting, tested at the Naval Proving Ground, subject to minor modifications, proved satisfactory, and that system has been definitely adopted. The manufacture of the four mountings for the Oklahoma and Nevada is making good progress. This type of mounting will also be adopted for the four turrets of the battleship Pennsylvania. The 14-in. Mark I. mounts for the New York and Texas are nearing completion, and the entire turret design for these vessels is reported to be a decided improvement on previous designs. The 14-in. Mark I. mounting will be installed in the two-gun turrets of the Oklahoma and Nevada.

Vessels of the New Jersey and Connecticut classes are all being equipped with 8-in. tube shell-hoists, and where the need was

apparent certain vessels of the above classes have been fitted with 12-in. tube shell-hoists.

The Report states that improvements have been made in turret telescopes, and that the Fleet has been supplied with telescopes embodying such improvements.

The ammunition handling arrangements of vessels of the Fleet have been greatly improved.

Nitro-cellulose powders.

Powder for the Navy is being manufactured upon the former specification, but improvements have been introduced in the methods to ensure uniformity and the incorporation of the right quantity of diphenylamine without variation. Experiments have been made in drying powders at high temperatures, but no results are known. Considerable alarm was created in certain naval circles by the Liberté catastrophe, owing to the fact that the United States and France both use a similar powder. It was suggested that disasters were to be anticipated in the United States Navy similar to those experienced in the French Navy. The two powders are of the same general type, both being nitro-cellulose powders, but they differ materially in the kind of solvent used, and French official reports showed that their methods of manufacture, blending and re-working are so unlike those employed by the Du Pont de Nemours Co. and the Government Works at Indian Head as to cause the two powders to be radically different. Recent reports from France are to the effect that all powder now in service will be withdrawn and replaced by powder of the American type. The specifications under which smokeless powder is manufactured for the United States Army and Navy are very stringent in requiring absolute purity of all material used, exceeding care in every portion of its manufacture, and step-by-step inspection of the powder from the raw-material stage to the finished product. The regulations regarding stowage, care and inspection of smokeless powder, both on shore and aboard ship, are comprehensive, and are strictly observed. Since the adoption of the present type of smokeless powder by the Navy Department not one accident has occurred due to decomposition or spontaneous ignition of the powder—a record which is probably not paralleled in any other service. No smokeless powder in which diphenylamine has been incorporated has as yet shown any signs of loss of stability, the oldest lot of powder containing this stabiliser being now four years old.

The experiments with ozokorite as an agent for reducing the erosion of guns were brought to a conclusion last year, it having been determined that, while powder charges with which ozokorite was mingled produced less erosion than charges containing the same

weight of powder, but containing no ozokorite, the disadvantages attending the use of ozokorite more than offset its advantages.

No change of any importance has been made in the design of armour-piercing projectiles, but higher qualities are required, and the manufacture is improved. The officers of the Ordnance Bureau believe that the tests are as severe as can be met by the manufacturers. Some of the old shells are being modernised and fitted with new fuses and long-point caps.

Experimental work. In compliance with the wishes of the Committee on Naval Affairs of the House of Representatives, the Bureau of Ordnance has prepared to carry out exhaustive experiments with armour-piercing projectiles and with relatively thin-walled projectiles carrying a large charge of high explosive. Special target structures have been built on "Experimental Target A" (late the Katahdin), but no results have been reported.

Coincidently with the preparations for the actual firing experiments at a target, experimental work is being conducted with several types of explosives to determine their sensitiveness, keeping qualities, and effectiveness of explosion.

The subject of the flight of projectiles and their action in the air has been investigated and a large amount of data gathered and compiled, all of which tend to confirm the statements made in the last Annual Report regarding the direction of the axis of a projectile in flight.

On the subject of armour it is stated that the specifications for the plates for the Oklahoma and Nevada were slightly more severe than formerly, but it is not anticipated that any difficulties will occur. No radical changes in composition or methods of manufacture have been made, and while cemented and non-cemented armour is being supplied, it appears that it cannot be stated that one type is superior to the other. Steady and slow improvement is anticipated. Special-treatment steel for turret tops has shown steady improvement, both in composition and methods of manufacture.

Torpedoes In so far as the design of material is concerned, the torpedo situation is reported by the Chief of the Ordnance Bureau to have greatly improved. The two new types of long-range, high-speed torpedoes have been built, and passed satisfactorily the test. Although it is not the department's policy to publish details in regard to these weapons, the Report states that a comparison of the characteristics of these torpedoes with those of the best torpedoes in service abroad indicates that the United States is at least abreast of all foreign countries in this respect. The Service is, however, still lacking in numbers, and the number of erratic runs and losses continues to be

greater than can be contemplated with satisfaction. There has been a very marked amendment in this respect in the submarine and destroyer flotillas, and Admiral Twining hopes that the same may be noted in the battleship fleet. There was considerable improvement during the year in the rapidity of manufacture and supply of torpedoes by contractors, and it is anticipated that during this year a considerable number of torpedoes will be added to the available supply.

Bethlehem Steel Co.

Armour and ordnance from the United States are now finding their way into the European market. Thus the Bethlehem Steel Company received orders for the complete armour and armament for the Greek battleship Salamis, now building at the Stettin Yard of the Vulcan Company, as well as for guns and ammunition for the Greek Navy, and armour for the new Italian battleships. There has also been a large order for 9·2-in. guns mounted in Bethlehem barbettes, with large quantities of armour-piercing ammunition, destined for the coast defence of Chile. Other foreign work has included large repeat orders from the Argentine Navy for guns and ammunition. The entrance of the American firm into competition with European ordnance firms is significant.

The Bethlehem 4-in. 50-calibre q.f. gun is fitted with an extremely large diameter pedestal, in order to distribute the firing stresses over as large an area of the deck as possible. This feature, together with the long recoil, enables the powerful gun to be used in destroyers which were thought quite recently to be capable of carrying only 4-in. low-velocity guns. This mounting is provided with the Bethlehem two-hand gear for both the elevating and the training mechanism, and with the control in a two-speed gear-box, so that the ratio can be changed by means of a foot pedal, even in the middle of a roll.

The American type of naval mounting for the 50-calibre 12-in. gun has special features. The gun is carried in a hydraulic cradle, and four powerful spring boxes are used, with a recoil cylinder in the centre-line below the gun. Above the right trunnion of the gun, which trunnion is of the frictionless knife-edge variety, is a prismatic sight of the horizontal periscope type, the sight setter's position being behind that of the gunlayer. The breech mechanism can be entirely man-handled, and although the Bethlehem Company supply guns fitted with hydraulic or electric breech mechanisms, the operation of the hand mechanism is simple and rapid, and in some quarters it is preferred to types operated by power.

It appears that the Bethlehem Steel Company's average output of armour has recently been well over 1000 tons per month.

Information regarding the plates generally cannot be given, but details are available concerning three special plates. One was a Bethlehem acceptance test plate, tested in July, 1912. The thickness varied from 9 in. to 8 in., and the dimensions were 105 in. by 138 in. The projectiles were 8-in. capped A.P., weighing 260 lb. No cracks developed in the plate, and in each case the shell was wrecked. The results of the firings at this plate are given below :—

Round.	Results.		De Marre.		Penetration.	Dish.	Effect on Plate.	
	Striking Velocity.	Energy.	Velocity.	Coeff.			Diam. Spall.	Diam. Impact.
		ft. tons.			in.		in. in.	in. in.
1	1626	4771·3	*1348·6	*1·205	1	0	29 × 32	8 × 8
2	1546	4313·1	*1292·5	*1·196	$1\frac{3}{8}$	0	11 × 38	7 × 8
3	1525	4196·1	*1263·5	*1·206	$1\frac{1}{2}$	0	5 × $11\frac{1}{2}$	$4\frac{1}{2}$ × 6

Another trial was of a 12-in. plate, and three rounds were fired to determine the acceptance of the group of armour represented. In none of them did the actual penetration exceed $2\frac{1}{2}$ in. The plate was curved on a 168-in. radius, and had a 6-in. oak backing. The projectiles were 12-in. capped A.P., weighing 870 lb. A fourth round was fired for information only. It will be noted from the table given below that, with a striking velocity of 40 f.s. higher than that prescribed by the governing specifications, the projectile effected an actual penetration of only 2 in.

Round.	Results.		De Marre.		Penetration.	Dish.	Effect on Plate.	
	Striking Velocity.	Energy.	Velocity.	Coeff.			Diam. Spall.	Diam. Impact.
		ft. tons.			in.	in.	in. in.	in. in.
1	1451	12713·3	*1272·4	*1·140	$1\frac{1}{4}$	$\frac{1}{4}$	14 × 14	9 × 10
2	1501	13604·6	,,	*1·169	$\frac{3}{4}$	0	None	7 × 8
3	1513	13823	,,	*1·189	$2\frac{1}{8}$	$\frac{1}{4}$	13 × 26	10 × 12
4	1476	13155·2	,,	*1·160	2	0	None	8 × 9

Another acceptance test plate was tested in January, 1913. The plate was of $6\frac{1}{2}$ in. thickness, and had a 6-in. oak backing. The projectiles were 6-in. capped a.p., weighing 105 lb., and the thickness at the point of impact was $6\frac{9}{16}$ in. No cracks developed, and in each case the projectile was wrecked. The actual penetration did

* It should be noted that in the above tables the velocities and co-efficients marked * can only be compared with other capped projectiles.

not in any case exceed 1½ in. The results of the test are given below:—

Round.	Results.		De Marre.		Penetration.	Dish.	Effect on Plate.	
	Striking Velocity.	Energy.	Velocity.	Coeff.			Diam. Spall.	Diam. Impact.
		ft. tons.			in.	in.	in. in.	in. in.
1	1812	2392·8	*1426·7	*1·27	Est. 1½	⅛	15 × 18	5½ × 6
2	1715	2143·5	*1417·2	*1·21	⅞	0	5 × 8	4 × 4½
3	1747	2224·2	*1426·7	*1·22	1¼	⅛	18 × 24	5 × 5½

France.

Two matters only concerning the French Navy can be dealt with here—the introduction of the four-gun turret in the new ships, and the question of the naval powders, which has so greatly agitated Service opinion and caused great general alarm.

The battleships of the 1912 and 1913 programmes—Bretagne and Normandie classes—are armed with the new 45-calibre 13·4-in. gun, which weighs 66 tons, and fires a 1190-lb. projectile with muzzle-energy of 65,340 foot-tons, calculated to be capable of penetrating 11·8 in. of Krupp steel at a range of 9000 mètres (9842 yards). In the Bretagne class, ten of these guns are mounted in five double-turrets on the keel line, but in the later class twelve guns are to be mounted in three quadruple turrets. It was a bold step to place four big guns in a single turret, but the French have not seldom displayed both originality and enterprise in matters of naval construction. The Italian, Austro-Hungarian, Russian and United States navies had adopted a triple mounting, and it seemed possible that a further step in the same direction was possible. The question of weight was predominant in the minds of the designers and constructors. With a lesser number of guns a double turret might suffice, but if twelve big guns were to be mounted in one ship, the displacement would considerably increase unless weights could be reduced. The Naval Staff and the Technical Committee of the Ministry of Marine were agreed upon the advantage of the plan proposed. A quadruple turret weighs more than a double turret, but the twelve guns, with mountings and turrets, weigh approximately the same as the ten-gun armament of the Bretagne. This is not the only advantage, for there is a large deck space and each turret has a very large arc of fire, while the arrangement of magazines

* It should be noted that in the above table the velocities and co-efficients marked * can only be compared with other capped projectiles.

is simplified. Such considerations weighed with the authorities, and early last year the Superior Council of the Navy, when the subject of the type of future battleships came up for discussion, approved of the principle. It has been rumoured, however, that when the final decision was arrived at, the quadruple turret was adopted by a rather small majority in the Council.

Naval opinion was doubtless divided upon the subject, and not a few officers disliked the idea of putting too many eggs in one basket. There was also the consideration that the quadruple mounting might become impracticable with a still bigger gun, and some officers doubted the wisdom or necessity of mounting twelve big guns in one ship. Another point was that the firing of the whole four guns simultaneously might have a serious effect upon the structural stability of the ship, and there seems to be an opinion that the experiment might be dangerous, and that simultaneous firing should not be resorted to. This consideration brings out another point—that the weight of broadside alone is not the real criterion of the fighting value of a ship, but rather the weight of discharge within a given time. No details have become public with regard to the type of mounting for these guns, nor of the arrangements of ammunition hoists, or the power to be employed. The secondary armament of the ships will be twenty-four 5·5-in. guns in casemates, and there has been some dissatisfaction that a rather larger calibre gun could not be adopted. The secondary guns will be provided with fire-direction and order transmission appliances like the big guns, and some critics think the complication may be too great. The 5·5-in. guns are really an anti-destroyer armament, but the provision of the appliances referred to seems to suggest that there is an idea they may also be used in fleet actions. **Quadruple turrets.**

A question which, perhaps more than all others, has pre-occupied the gunnery department of the French Navy has been the safety of the powders employed. An account was given in the *Naval Annual* last year of the procedure adopted by the authorities after the Liberté catastrophe, the inquiry of Rear-Admiral Gaschard's committee, the action that followed, the further inquiry of a joint Naval and Military committee, the decision of Admiral Bellue to send some suspected ammunition ashore, and the subsequent disembarkation of ammunition more than four years old. It was shown that the B powder was not chemically homogeneous, that it had been subject to a destructive process of treatment or *remalaxage*, as well in many cases of several dryings at high temperature. The authorities were compelled to change front in this matter. In December, 1911, the Minister, on the authority of the Superior Council of the Navy, **Propellants.**

said, apart from the older powder, that the ammunition would not be disembarked, because "France was not to be disarmed before the foreigner." The removal of the material of earlier manufacture, began on September 12, 1911, and continued until March 19, 1912. By that date some of the more recent lots of powder had fallen under suspicion, and the process of sending them ashore begun. Meantime, the double catastrophe of exploding charges on board the Jules Michelet occurred on June 26th, and before the close of September, all the powder treated by the amylic alcohol (AM) process was disembarked. The order for this measure of precaution was issued on July 31st, after much consideration and inquiry, and henceforth only powder prepared with diphenylamine (known as D powder) is to be employed. The French powder, like that employed in the United States, has a nitro-cellulose base, but the processes of manufacture had been irregular, the solvent used was different, and there was not the necessary stringent selection and examination of the material, while the incorporation of old powder with that of more recent date had opened a serious source of danger.

D powder.

Accidents in the Jules Michelet.

The accidents on board the Jules Michelet occurred at the Salins d'Hyères while gunnery practice was in progress. At 3.35 P.M. on June 26th, a cartridge exploded during the charging of a 6·4-in. gun in one of the port turrets, which gun had fired 113 rounds in the morning and forty-eight rounds after the resumption of firing. A jet of flame issued from the breech, the cartridge exploded, and ten men were injured, some of them seriously. There was no panic, and firing was continued, with the laudable object of maintaining confidence and discipline. But, at 6 o'clock in the evening, a disaster of precisely similar character occurred during the loading of another gun of the same calibre, which gun had fired 107 rounds in the morning and 113 in the afternoon. A Lieutenant and ten men were injured in the second explosion. As a result of these two accidents several lives were lost. In each case the air blast had been applied for eight seconds before introducing the projectile, and for six seconds afterwards. The firing had been conducted slowly, and all the regulations had been observed. The powder used was described as "BM 2-AM 8-4-10-SM-02-12," being a numbered lot of amylic alcohol B powder of 1910 supplied by the Saint Médard factory. An inquiry into the circumstances was conducted by a committee composed of General Gaudin, Captain Schwerer, Colonel Koehler, and M. Marquerol, chief expert on Government powders. The theory that the great heat of the guns might have caused the disasters was discussed. The explanation most probable was that incandescent fragments had ignited heavy residual gas remaining in

the gun, which in turn had caused the explosion of the cartridge. A sort of reproduction of the accident was devised by Lieut. Ravel and another officer, who placed a cartridge in a copper tube of the size of the gun, and residual gas bursting into flame caused the explosion of a cartridge. The conclusion was that the air blast was insufficient to drive out the heavy gas. The section of the blast was too small, so that it swept through, carrying away some gas, but leaving enough to cause danger, and it has since been decided to employ a more effective hydro-pneumatic blast.

Effect on gun practice.

The effect of the disaster was serious. It put an end for some time to the gunnery of the Fleet and the prize-firing. Officers were in the greatest uncertainty, and order after order came from the Minister of Marine instructing that one lot of powder or another should be discharged from the ships. Orders were transmitted by wireless telegraphy, and certain vessels at sea returned at full speed to Toulon to carry out the orders. It was said that the Third Squadron had disembarked all its powder at Sant Nicholas in August, when instructions came to carry out some blank firing, whereupon powder was sent to the squadron in lighters at Quiberon, and from these just enough was taken to permit the firing to take place Then the powder was sent ashore at Brest, but on the order to proceed to the Mediterranean it was re-embarked, and finally disembarked at Toulon. Happily confidence seems now to have been restored, and the powders of 1912 are made from new gun-cotton with diphenylamine as the solvent agent. In the course of the discussion of the Budget in February, M. Painlevé, who had dealt with the subject in his report on the Navy, was not, however, content. He said that the heat treatment was a great danger, and advocated trials of a nitro-glycerine powder. The proper chemical treatment of gun-cotton intended for nitration had never been studied, and each change had been a tentative imitation of what was being done abroad. General Gaudin, chief of the French explosives department, which still bears the old name of "Poudres et Salpêtres," affirmed, on the other hand, that the powder delivered in 1912 possessed excellent qualities, that it was very superior to the older powder, and, compared with powders recently brought for the Navy and which certain American factories had offered, that it possessed an incontestible superiority. The gunnery work of the Fleet has been resumed. The cessation of the most important work in the training of the officers and men had disheartened many, and a feeling of discouragement was widespread but now a corresponding feeling of exhilaration has followed the resumption of the gunnery training in the ships.

Germany.

New guns. Two new guns of large calibre have appeared in the Krupp lists this year, and details will be found in the tables at the end of this Part. They are a 38·1 cm. (15 in.) and a 40·66 cm. (16 in.), and each of them is shown in a light and a heavy model, the former presumably for ship use and the latter for fortress emplacements. It is possible, or probable, that not all these guns have been made, for a 50-calibre 16-in. gun is not yet within the range of practical ship design. The 38·1-cm. (15-in.) gun takes the place of a 38-cm. (14·96-in.), which was in last year's tables, and the ballistic details are not therefore quite the same. Particulars of these guns, converted to English measures, are given below, the reference being in each case to the lighter pattern gun :—

—		38·1 cm. = 15 in.			40·46 cm. = 16 in.		
Length, calibres		40	45	50	40	45	50
,, bore	ft.	50	56·2	62·5	53·3	60·1	66·8
,, total	,,	53·2	59·5	65·7	56·7	63·3	70·1
Weight	tons	65·9	74·9	84·4	80·1	90·9	102·4
,, shell	lb.	1,677·6	1,677·6	1,677·6	2,028·2	2,028·2	2,028·2
,, charge	,,	454·0	531·2	615·0	555·5	643·7	1,097·3
Initial velocity	ft. sec.	2,625	2,789	2,953	2,625	2,789	2,953
Muzzle energy	ft. tons	80,048	90,380	101,328	96,904	109,400	122,693
Perforation (steel) at muzzle	ins.	42·5	46·3	55·2	45·4	49·6	53·5

Anti-air-craft guns. Krupp anti-air-craft guns have already been illustrated and described in the *Naval Annual.* The mounting of such guns in warships is evidently being considered in Germany, and the question is likely to become of great importance in the near future. The Krupp company now shows two models of the gun for ship use, both on pedestal mounts, one a 12-pdr., and the other a 4·7-in. Though primarily intended for the attack of air-craft, these guns can be used for the same purpose as other guns of the same calibres. The object, therefore, is to substitute such guns for other ordinary guns, and consequently not to add a special type of gun, which is certainly undesirable in view of the limited space available in warships. Great care has been devoted to providing suitable sights for the guns, and it is claimed that the prismatic type employed, giving a large field of vision, are excellent in simplicity and effective use. The smoke-projectile, or tracer, for observing the flight of the shell, is now well-known, and these Krupp guns are provided with effective shells fitted with delicate fuses, which will, it is stated, cause detonation upon striking the thin material of a balloon. For

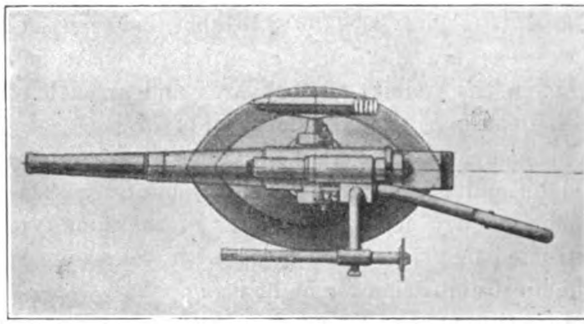
land use the Krupp Company have a 12-pdr. field gun, with an elevation of 65 deg., which can be used against air-craft. A 2·8-in. gun, with 11 lb. shot, is adapted for mounting in a power-car or wagon. The 4·1-in. gun, with 30·8 lb. shot, is for fixed positions, and such weapons are no doubt essential for coast defences and emplacements in the vicinity of dockyards and arsenals. Both the special anti-balloon guns have an elevation of 75 deg.

The same company have also introduced a new type of man-handled 4·1-in. and 2·9-in. gun for ship mounting. These do not seem to differ greatly from other guns of the same type, but are finely constructed and balanced, fitted with telescopic sights, and have glow-lamp illumination for night firing.

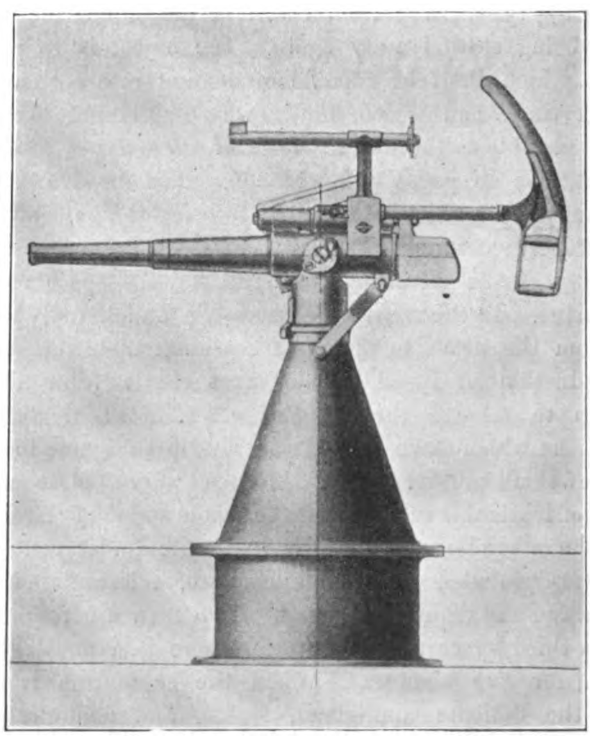
Guns for submarines. More interesting are the Krupp guns for the arming of submarine boats. Of these there are two types, one with a fixed pedestal mounting, to be bolted on the hull of the submarine, and the other of a disappearing type, rising from a well in the submarine for action, and then being stowed away again. The object is to provide an armament which shall be capable of coming into action within a very short time, and which, under way, shall offer the smallest resistance possible to the water. Both of these types are shown in the illustrations on pages 384 and 385. The disadvantage of the disappearing type is the time required to bring the gun into action—which, however, according to the accounts, seems to be very short—the complication of the mountings, and the stowage space required in the submarine. In the other type there are undoubtedly difficulties arising from the probable action of sea-water upon the guns, and a certain reduction of speed which must result from the added obstruction to passage through the water. It is doubtless these considerations which have caused the Krupp designers to make the fixed gun of small calibre. It is a 3·7-cm. (1·45 in.) piece mounted on a pedestal of lenticular section, and the whole weighs 5·23 cwt. The gun rests in a cradle, and there is hydraulic buffer control of the recoil. It is provided with shoulder-piece, telescopic sights, and hand elevating and depressing wheel. Two men are required at the gun, and a third for cartridge supply. There is a magazine on the right side for five changes. When the submarine is about to descend, the delicate appliances, sights, and shoulder-piece are removed and stowed below, the muzzle of the gun is closed with a tompion, and the breech has placed over it a water-tight covering.

The disappearing gun is a 12-pdr, and with its equipments weighs 15·75 cwt. When the gun is stowed below the only projection from the hull of the submarine is the small base for the pivot mounting, which has sloping sides, intended to reduce to a

minimum the resistance to water-passage. There is a cover-plate for the opening, through which the gun is raised, and the upper

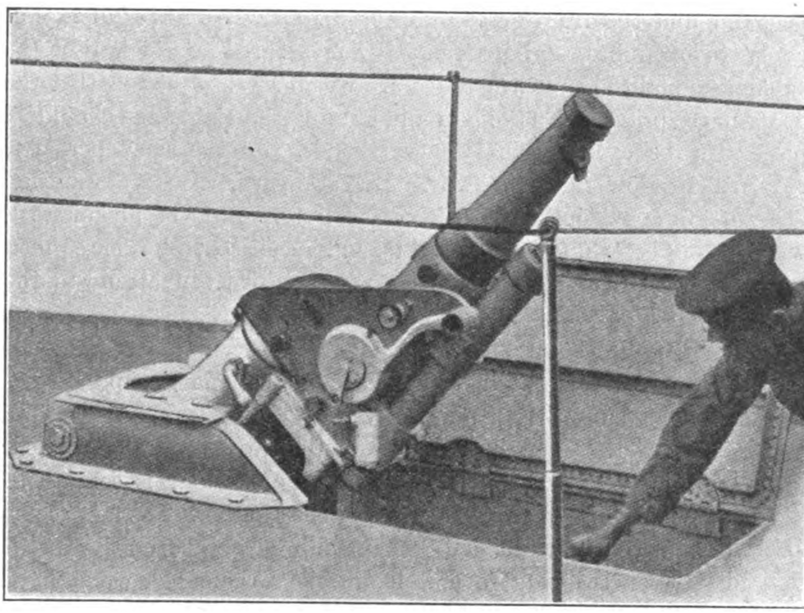


KRUPP GUN FOR SUBMARINES.
Plan of the Fixed Mounting.

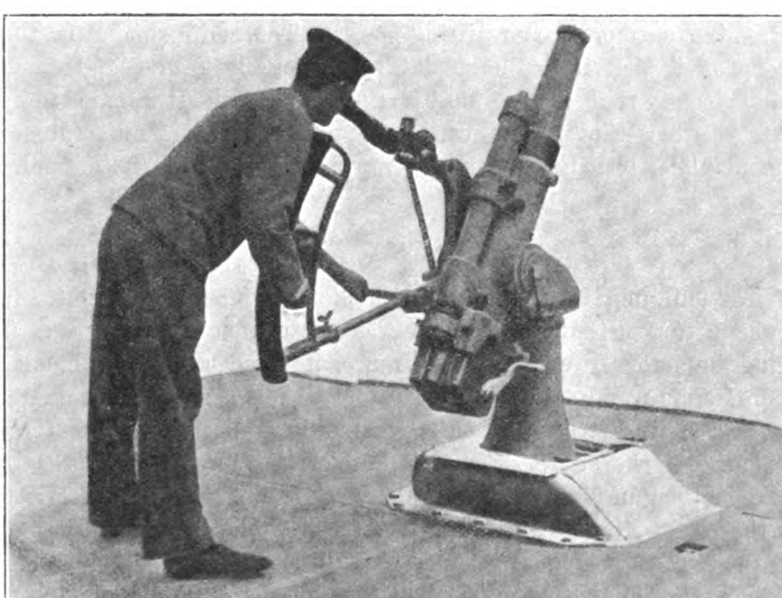


KRUPP GUN FOR SUBMARINES.
Permanent Mount.

part of the projecting base is removed. The gun-mounting is pivoted below, and is brought up by electric power, one man attending the operation of bringing it into position, after which the cover-plate



KRUPP DISAPPEARING 12-PDR. GUN FOR SUBMARINES.
Bringing the Gun into Position.



KRUPP DISAPPEARING 12-PDR. GUN FOR SUBMARINES.
In Action against Air-craft.

is closed, and the front of the gun-base replaced. The gun is thus ready to open fire, and its mounting is secured to the hull of the submarine and the supports which are within. It is stated that the operation of bringing up the gun and affixing the sights and shoulder-piece can be executed in twenty seconds, and the same period is required to stow the gun away. Ballistic particulars are wanting, but the gun is evidently short for its calibre. It is of nickel steel, with sliding breech, telescopic sights, and recoil control. Three men are required at the gun, but if necessary the third can attend to the ammunition supply.

Armour. Very little can be said about armour-production in Germany, all details being confidential, but there are indications that progress is being made in improving the quality of the output. The views of "Nauticus" are given in the introduction to this foreign section. Statements have been made that a new type of armour is coming to the front, but they must be received with great caution. The fact seems to be that an engineer named Schaumann has experimented with thin plates, consisting of several laminations cemented, which have shown great power of resistance to rifle fire. According to the accounts published, bullets which went clean through a nickel-steel plate merely rebounded from the Schaumann plate or broke up. This invention seems therefore to have some relation to the bullet-proof shields which have been introduced from time to time as possessing extraordinary resisting power. The claim made for the invention is that it produces plates considerably lighter and much more cheaply than is possible by other processes. It remains to be seen whether the process can be applied to the manufacture of armour-plates tested under the severe conditions of the trial ground.

ITALY.

The building of battleships in which three guns were mounted in a single turret, though the plan was not confined to Italy, and is being numerically exceeded in France, imposed a great difficulty upon Italian naval constructors. The provision of the armaments did not exceed the resources of the splendidly equipped Vickers-Terni ordnance works at Spezia, nor, indeed, of the Terni steel works to produce the gun-forgings. Both these establishments were described in the *Naval Annual* last year. The real trouble arose in the matter of the armour, though the Acciaierie di Terni are credited with a capacity for an output of 12,000 tons of Krupp steel plates per annum. It would appear, however, that the great demand for the armour-plates and complicated gun-turrets of the four Dreadnoughts

came at a time when these resources had not been fully developed, and the contract of the Terni works was to produce 500 tons per month, or one-half of the estimated total capacity of the establishments. Tenders for a large quantity of armour—4200 tons—to supplement this supply were opened, and contracts were secured by the Carnegie and Bethlehem steel companies of America.

Delay, however, occurred in Italy, and though the Dante Alighieri has been completed and has passed through her trials, the three other ships have been retarded by the late delivery of armour. The causes of this delay have been explained by Signor Raffaele Bettini, director of the Terni steel works, and as they illustrate the difficulties which are apt to arise in such matters, they may be described here with advantage. A new plate-rolling mill was being installed, but MM. Schneider, of Le Creusot, who were supplying the plant, or part of it, were six months late in their delivery, being the last two months of 1910 and the first four months of 1911. The consequences, however, would not have been serious, owing to the large resources of the works, if it had not been that the armour for the Dante Alighieri was still in hand, and very evidently occupying a considerable part of those resources. Orders had been given at such times that the work fell upon the last six months of 1910 and the first six months of 1911, and the difficulty was increased by one of the best presses at the works breaking down, and by the extraordinary difficulties attending the making of the new turrets, conning-tower, and other parts. The result was that the steel works were engaged upon the work for the Dante Alighieri when they should have been employed upon plates and turrets for her three successors. The chief trouble was with the turrets, which presented unusual complications, and exacted an enormous amount of work. The authorities had not given the orders in due time, and the director of the works says that no foreign establishment could have executed the work better in such conditions. It seems to be a fact that the system of ordering the armour and ordnance requirements of ships in Italy is very defective, and that in the case of the first Dreadnought the most difficult and complicated parts of the armour were ordered last.

Armour-plates.

The result was that the work upon the armour of the other ships could not be carried on with the desired intensity. It further appears that delay has occurred in delivering the American armour-plates also, and in March, 1913, some of this armour was still wanting for the Leonardo da Vinci and Giulio Cesare. The American companies are to provide the side armour for the Andrea Doria, and the Terni steel works have that for the Duilio in hand. It is

admitted, in the circumstances in which the orders are given, that the Terni works could not have engaged to deliver the whole of the armour for both ships within the period allowed by the authorities, which terminates during the first six months of the present year. The directors of the Italian company anticipate that the works will complete the Duilio's armour supply in due time. All the ten gun turrets for both ships will be supplied by Terni, and it would not be surprising if some retardation occurred in completing them, but the director says the establishment is as well equipped as any like establishment abroad.

Gun-mounting trials of Dante Alighieri.

After showing the difficulties under which the Italian establishments labour—difficulties evidently of a transitory nature—it is pleasant to turn to the results of their endeavours, as shown in the successful trials of the Dante Alighieri at Spezia in December. With the satisfactory steam trials we have here nothing to do. The guns in each turret were fired simultaneously, with greater elevation than would ordinarily be the case, and the heaviest projectile that is employed, and the results were completely successful. The solidity and stability of the ship were demonstrated, and the turrets worked with complete ease and satisfaction, and the advisability of employing the triple turret in future ships was fully assured. The design and construction had been long considered, and those responsible are to be congratulated on what they have achieved. It was recorded that the firing of a single lateral gun in the turret caused even less side movement than has been the case with coupled guns in Italian ships.

The great demands for the Italian Navy have brought new activities into play. Signori Gio. Ansaldo & Co., of Genoa, have laid down a great plant for ordnance and armour production. The ordnance works are entirely newly erected, and are provided with modern and powerful tools and appliances for the construction of guns from the largest to the smallest calibre, and work is in hand for the secondary armaments of the battleships Duilio and Doria. At Cornigliano, close to the steel foundry, important steel works have been erected within these last two years for the making of armour of all kinds and of gun elements. The works are fitted with the most modern plant and appliances, including four hydraulic presses from 8000 to 15,000 tons.

The Iéna and Liberté disasters aroused the deepest interest and concern in the Italian Navy. The Italians have themselves had serious disasters from the spontaneous explosion of their ballistite powder, which, however, has a nitro-glycerine base. There have been explosions on board the Marco Polo and Sicilia, and on shore at

Fontana Liri, Castagna, Avigliana, Ferrara and Taranto. The whole subject of smokeless powders and nitro-cellulose has been treated very exhaustively by Captain Bravetta, a well-known authority, in the *Rivista di Artiglieria e Genio*, who expresses himself unable to understand why the French retained so long the B. powder, after so many great and minor explosions and disasters in the fleet and the naval establishments during the last eighteen years—Amiral Duperré, Vauban, Descartes, Forbin, Charlemagne, Iéna, Liberté, Patrie, Suffren, Diderot, Justice, and, more recently, Jules Michelet. Captain Bravetta says an adequate solution of the powder question has not been reached, and that it demands the exhaustive care of chemists, gunners, and manufacturers. Recognising the danger attending nitro-explosives, he does not necessarily advocate their abandonment. The immediate question is to remove any possibility of a repetition of such disasters as those of the Iéna and Liberté, and the question of the future is to arrive at a compound chemically more stable. For the first object there must be scrupulous care in manufacture, rigorous examination of materials, and questions of cost must not enter into the matter at all. Powders must be kept in a constant and relatively low temperature. There must be constant watchfulness, and any lots suspected must be removed immediately. Other powder and fulminates must not be kept in magazines with smokeless powder. Captain Bravetta does not approve of powder in tubular grains. As to the powder of the future, he refers to the American Robin Hood powder, which is composed mainly of picrates of ammonia and potassium and nitrate of barium, with some vegetable and other ingredients, and is prepared with a very special treatment, which need not be described here. The Italian officer does not believe that smokeless powder, with a nitro-cellulose base, is the *ne plus ultra* of science.

Italian powders.

Austria-Hungary.

The powder question has also engrossed much professional thought in Austria-Hungary, where what is known as "ammonpulver" has been adopted, composed of 80 to 90 parts of nitrate of ammonium, with wood carbon, the latter prepared in various ways according to the intended use of the compound, as a propellant or an explosive. This material produces little smoke, and this is rapidly dissipated.

Little can be said about the ordnance and armour supplies of the Austro-Hungarian Navy. The same problems which have confronted Italian engineers and constructors have been met, and with more or less success have been solved. The Viribus Unitis was built rapidly

—within a period of about two and a half years—so that no delay was caused by non-delivery of guns, turrets, or other armour. Various statements were made about the ship which were transparently absurd. It was said that the turrets were heavier than was expected owing to the constructors having forgotten to include the gun-mountings in the calculation of weight, and that the "guns were to be lightened." Probably it was true that the ship exceeded the intended displacement, which would not be surprising, considering experience elsewhere. Other and later statements have been made concerning the effects of firing the guns simultaneously, but at the time of writing there has been no official confirmation of the statements as to defects revealed.

It is much to the credit of the Skodawerke at Pilsen and the Witkowitz steel works in Moravia that the guns and armour, including the complicated turrets, mountings, and mechanism, were produced in due time. These establishments are now on a great scale, and have been successively enlarged. The armour-plate works at Witkowitz, which had steam-driven plant, did not suffice for the new requirements, which were foreseen, and in October, 1909, work was begun upon a new steel and armour-plate rolling plant. with electric power, and the first plate was rolled in August, 1910. Since that time the whole of the works have been completed, the electric power being installed on the Ilgner system, and the works include a large gas-generating plant. Ingots up to 100 tons are dealt with, and the efficiency of the system and large capacity of the works are shown by the timely manner in which the armour requirements of the new ships have been completed.

BRITISH RIFLED ORDNANCE.

Ordnance. — Nature. — Calibre or Pr.	Ordnance. — Nature. — Weight.	Ordnance. — Nature. — Mark and Service.	Ordnance. — Total length in inches.	Ordnance. — Length of Bore, including Chamber.	Ordnance. — Chamber. — Diameter.	Ordnance. — Chamber. — Length to base of projectile.	Ordnance. — Rifling. — Twist one turn in — Least at breech.	Ordnance. — Rifling. — Twist one turn in — Greatest at muzzle.	Ordnance. — Rifling. — System.*	Charge. (full). — Weight.	Charge (cordite). — Weight.	Charge (cordite). — Size.	Projectile. — Diameter.	Projectile. — Weight.	Projectile. — Bursting Charge of Common Shell.	Projectile. — Value of $\frac{d^3}{w}$.	Projectile. — Value of $\frac{w}{d^3}$.	Ballistics (with full charges). — Muzzle velocity.	Ballistics. — Total muzzle energy.	Ballistics. — Muzzle energy per ton of gun.	Ballistics. — Perforation of wrought iron. — At muzzle.	Ballistics. — Perforation of wrought iron. — At 1000 yards range.	Ballistics. — Perforation of wrought iron. — At 2000 yards range.	Ballistics. — Perforation of wrought iron. — At 3000 yards range.
				cals.	ins.	ins.	cals.	cals.		lbs.	lbs. ozs.		ins.	lbs.	lbs.			f. s.	ft. tons.	ft. tons.	ins.	ins.	ins.	ins.
QUICK-FIRING GUNS (using metal cases)																								
6·0 in	7 tons	I. & III. II. (Wire)	249·25	40	..	..	60	30	P.	..	13 4	30	6·0	100·0	..	0·360	0·463	2200	3356	479	15·9	12·7	10·2	8·2
6·0 in Q.F.C.	5 „	I. to VI.	169·1 166·6	26·2 26·6	.. ..	.. ..	.. ..	.. ..										1913	2537	362	13·0	10·3	8·2	6·4
4·7 in.	41 cwt. 42 „	I. II. III. & IV. Wire	194·1	40	..	..	100 0	34·4 30	E.O.C.	..	5 7	20	4·72	45·0	..	0·495	0·428	2188	1494	711	12·4	9·2	6·6	5·0
4 in.	26 cwt.	I. II. III. Wire converted guns	165·25 120	40 28	..	..	..	30	M.Pl.	..	3 9	15	..	25·0	..	0·640	0·390	2300 2177	917 821	705 569	10·5 9·5	6·9 6·5	4·9 4·6	3·3 3·0
12-pr.	12 cwt.	I.	123·6	40	..	..	120 0	28 30	E.O.C. M.Pl.	..	1 15	10	3·0	12·5	..	0·072	0·463	2210	423	677	8·1	5·3	3·5	2·4
12-pr.	8 cwt.	I.	87·6	28	..	..	60 0	28 30	E.O.C. M.Pl.	..	13¾	10	3·0	12·5	..	0·072	0·463	1607	223·8	544	4·9	3·2	2·4	..
Hotchkiss . 6-pr...	8 cwt.	I. & II.	97·63	40·0	..	..	180	29·9	M.Pl.	..	b7¾	5	2·24	6·0	..	0·836	0·534	1818	137·5	344·8	4·8	2·8	..	..
Nordenfelt . 6-pr...	6 cwt.	I. II. & III.	104·4	42·3	..	..																		
Hotchkiss . 3-pr..	5 cwt.	I. & II.	80·63	40	..	..	25	25	M.Pl.	..	b6⅜	5	1·85	3·3	..	1·037	0·521	1873	80·3	321·2	4·1	2·1	..	..
Nordenfelt . 3-pr...	4 cwt.	I. L.	91·5	45·4									..	..	..	..	..	1920	84·3	337·2	4·3	2·2	..	..
MACHINE GUNS.										grains.				grs.										
Maxim, 1 bar 0·45 in.	63 lbs.	I.	45·0	..	..	..	10	27	Enfi'ld	31 Cordite	..	..	0·450	480	..	2·952	0·751	..	..	..	Same as M.H. Rifle.			
Maxim, ·303			42·38				10	25·6	Metf'd				0·303	215	..	..	..	..	..	..	Same as Lee-Metford.			

* P. means Polygroove; M.Pl., Modified plain.

b With 4 grs. R.F.G.

Note.—An armour-piercing shell has now come in for the 6-in. guns.

BRITISH RIFLED ORDNANCE.—*continued.*

Other guns are mounted, but details are withheld from publication.

Ordnance. Nature. Calibre or Pr.	Nature. Weight.	Nature. Mark and Service.*	Total length in inches.	Length of Bore, including Chamber.	Chamber. Diameter (at largest).	Chamber. Length to base of projectile.	Rifling. Twist one turn in. Least at breech.	Rifling. Twist one turn in. Greatest at muzzle.	System.†	Charge (cordite). Weight.	Charge (cordite). Size.	Projectile. Diameter.	Projectile. Weight.	Projectile. Bursting Charge of Common Shell.	Projectile. Value of $\frac{d^2}{w}$.	Projectile. Value of $\frac{w}{d^3}$.	Muzzle velocity.	Ballistics (with full charges). Total muzzle energy.	Perforation of wrought iron. At muzzle.	Perforation of wrought iron. At 1000 yards range.	Perforation of wrought iron. At 2000 yards range.	Perforation of wrought iron. At 3000 yards.	Perforation Krupp steel, 3000 yards. Uncapped Shot.
B.L. GUNS.				cals.	ins.	ins.	cals.	cals.		lbs. oz.		ins.	lbs.	lbs. oz.			f. s.	ft. tons.	ins.	ins.	ins.	ins.	ins.
16·25-in.	110½ tons.	III.	524·0	30·0	21·125	84·5	newer patterns.	30	Modified Pl. Section, the last in the new guns.	960‡ S.B.C.	..	16·25	1800	‡‡193 **179½	0·147	0·420	2087	54,390	38·0	34·6	31·7	29·4	13
13·5-in.	69 & 67 tons.	I. II. III.& IV.	433·0	30·0	18·0	66·5		30		187 8	..	13·5	1250	**85	0·146	0·508	2016	35,230	33·0	30·2	27·6	25·2	11
12-in.	46 tons.	VIII. Wire	445·5	35·43	16·0	70·0		30		167 8	50	12·0	850	80–1$\frac{9}{11}$	0·169	0·492	2367	33,020	37·0	32·7	29·4	26·6	11½
12-in.	50 tons.	IX. Wire	496·5	40·0	17·5	87·2		..		201 8 / 9 8	50 / 3¾	12·0	850	,,	..	..	2481 / §2580	36,290 / 39,280	39·7 / 42·0	35·4 / 38·0	31·6 / 34·6	28·7 / 32·0	12½ / 14
12-in.	58 tons.	X. Wire	558·0	45·0	..	..		..		325 0 M.D.	..	12·0	850	..	..	..	2900	47,697	51·0	46·2	42·0	38·4	17
10-in.	31 tons.	Triumph & Swiftsure	483·0	45·0	14·0	64·5		..		..	..	10·0	500	..	..	..	§2800	§27,205	39·5	34·6	30·2	27·0	11¾
10-in.	29 tons.	II. III. III.A & IV.	342·4	32·0	14·0	54·0		30		76 0	30	10·0	500	37¾	0·200	0·500	2040	14,430	24·8	21·8	19·3	17·0	7½
9·2-in.	21 & 22 tons.	I. & II.	255·8	25·56	11·0	44·0		35		42 0	30	9·2	380	18 ‡‡33 **30$\frac{6}{16}$	0·223	0·488	1781	8,356	18·3	15·9	14·4	12·4	5½
9·2-in.	24 & 22 tons.	III. V. VI. VI.A&C & VII.	310·0	31·5	12·0	43·0		30		53 8	30	9·2	380		0·223	0·488	2065	10,910	22·9	19·8	17·2	15·5	6¾
9·2-in.	25 tons.	Wire VIII.	384·0	40·08	10·5	53·15		..		63 0	40	9·2	380	..	0·223	0·488	2347	14,520	27·6	23·9	20·7	18·0	7¾

9·2-in.††	28 tons.	Wire X.	442·35	46·6	13·0	71·215	Various in the	..	P. Elswick, Hook, or	103	0	44	9·2	380	..	0·223	0·488	2640 §2800	18,400 20,685	33·3 36·0	28·9 31·2	25·0 27·4	22·0 24·0	9½ 10½
7·5-in.	16 tons.	Triumph & Swiftsure	386·7	50·0	..	46		..		..		..	..	200	..	0·281	0·474	§2800	10,883	29·0	24·9	21·4	17·8	7¾
7·5-in.	14 tons.	..	337·5	45	11·1	55		30		47 2	0 8	30 2¼	7·5	200	18½	0·281	0·474	2600	9,340	26·0	22·3	18·8	15·7	6¾
6-in.	5 tons.	III.	170·7	25·53	8·0	26·75		35					6·0											
6-in.	5 tons.	IV. VI.	173·5	26·0	8·0	26·75		35 30		14	12	20	6·0	100	7 4/16 **9 13/16	0·360	0·463	1960	2,665	13·4	10·7	8·9	7·0	3
6-in.	7·4 tons.	VII. VIII.	269·5	45	8·5	32·7		30		20	0	20	6·0	100	9	0·360	0·463	2493 §2750	4,308 5,250	19·6 22·3	15·3 18·0	11·9 14·6	9·8 11·6	4½ 5
4-in.	23 cwt. 26 cwt.	II.II$_P$.III.III$_A$. IV.V.& VI.	120·0	27·0	5·3	18·5	120	30		3	1	5	4·0	25	11 13/16 3 3/16	0·640	0·391	1900	625	7·7	5·4	4·0	3·0	..

* The Roman numeral is the number of the pattern given. Further differences in pattern are indicated by letters a, b, and c. Some details of the 12-in. Mark X. uncertain.
† P. means Polygroove; Pl., Plain; ‡ Cordite has not been introduced for this gun; § Estimated with M.D. cordite;
** Cast steel; †† A 50-calibre 9·2-in. gun is under construction; ‡‡ Forged steel.

AUSTRIAN NAVAL ORDNANCE.

Designation by Calibre, in centimètres, length in calibres, and type of gun	30·5 L. 45 Skoda.	24 L. 45 Skoda.	24 L. 40 Skoda.	24 L. 40 K. 97	24 L. 40 K. 94	19 L. 42 Skoda.	15 L. 40 Skoda.	15 L. 40 Krupp	15 L. 35	12 L. 40 Skoda.	12 L. 35
Calibre, in inches	12·01	9·45	9·45	9·45	9·45	7·5	5·91	5·9	5·87	4·72	4·72
Length: Total, in feet	45·0	35·5	31·5	31·5	31·5	26·3	19·5	19·5	17·13	15·74	13·8
Length: Rifled Portion, in ins.	417·9	325·8	290·3	290·3	286·2	239·7	182·6	182·5	153·6	147·6	126·3
Length: Powder Chamber in ins.	78·3	65·2	55·5	55·5	63·7	51·8	35·4	35·4	35·4	28·6	28·6
Length: Of bore in calibres	45	45	40	40	40	42	40	40	35	40	35
No. of Grooves	92	72	72	72	72	56	44	44	44	36	36
Twist in calibres	40–25	40–25	45–25	45–25	∝–25	45–25	∝–25	∝–25	45–25	45–25	45–25
Weight: Gun, tons	51–9	26·23	27·30	29·8	27·5	11·9	4·22	4·36	3·68	2·04	1·94
Weight: Breech Block, in lb.	3450·2	1873·9	1336·0	..	1450	..	330	339·5	346	172	211·6
Weight: Steel Shell "	992	473·0	504·8	473	473	213	102·1	102·1	102·1	52·4	52·4
Weight: Common Shell "	992	473·0	504·8	473	473	213	112·5	..	102·1	52·4	52·4
Weight: Shrapnel Shell "	..	..	..	..	..	213	..	..	102·1	52·4	52·4
Weight of Bursting Charge: Steel Shell "	7·3	2·03	8·3	8·3	8·3	6·38	3·31	3·31	1·98	1·1	1·1
Weight of Bursting Charge: Common Shell "	53·6	23·4	29·5	29·5	47·3	10·6	4·84	4·84	5·73	2·86	2·86
Weight of Bursting Charge: Shrapnel Shell "	..	..	..	..	..	1·98	1·00	1·00	1·00	0·53	0·53
Weight of Firing Charge: Steel Projectile, in lb.	304	156·2	99·2	99·1	91·5	59·6	18·29	18·29	17·82	9·7	9·7
Weight of Firing Charge: Common Shell, in lb.	304	..	99·2		91·5			18·29	17·82	9·7	9·7
Weight of Firing Charge: Shrapnel, in lb.	..	..	..	..	..	23·1	11·85	11·85	11·85	4·41	4·62
Muzzle Velocity, in feet	2625	2625	2313	2313	2264	2625	2264	2264	2133	2264	2133
Muzzle Energy: Total, foot-tons	..	..	..	..	..	..	..	..	..	..	..
Muzzle Energy: Per inch circumference, foot-tons	..	..	..	..	..	..	..	..	..	..	..
Thickness of Iron, perforated inches at Muzzle, by Tresidder's formula	..	..	..	..	..	..	..	..	..	..	..
Perforation of Krupp Steel, 3000 yds., inches	..	..	..	..	..	..	..	..	..	..	..

There are other types of Krupp guns, also Skoda 7-cm., Skoda and Hotchkiss 47-mm., and Hotchkiss 37-mm.

Corrected to March, 1913.

DANISH NAVAL ORDNANCE.

Designation by Calibre, in centimètres, length in calibres, and type of gun	26 L. 35 Krupp	24 L. 40 1893 Krupp.	24 L. 40 1896 Canet.	24 L. 43 1901 Bofors.	24 L. 43 1906 Bofors.	21 L. 35 Krupp.	15 L. 35 1888 Krupp.	15 L. 43 1896 Bofors.	15 L. 43 1901 Bofors.	15 L. 50 Bofors.	12 L. 40 Krupp.	8·7 L. 40 Krupp.	7·5 L. 55 Danish semi-aut	5·7 L. 44 Hotch-kiss.	4·7 L. 44. Hotch-kiss.	4·7 L. 50 Danish semi-aut.
Calibre, in inches	10·24	9·45	9·45	9·45	9·45	8·24	5·87	5·87	5·87	5·87	4·72	3·43	2·95	2·24	1·85	1·85
Total length, in feet	29·86	31·50	31·50	33·86	33·86	24·05	17·12	21·17	21·17	24·46	15·75	11·41	13·53	8·13	6·72	7·71
Length of Bore, including Powder Chamber — in inches	327·6	349·7	358·5	397·0	397·0	264·5	189·0	244·0	247·4	286·4	176·4	126·8	152·6	89·8	74·1	87·6
Length of Bore, including Powder Chamber — in calibres	32·0	37·0	37·9	42·0	42·0	32·1	32·2	41·6	42·1	48·8	37·3	37·0	51·7	40·0	40·0	47·3
Number of Grooves	60	72	60	60	60	48	36	44	44	44	36	32	28	24	20	20
Twist of Rifling, in calibres	70–25	00–25	72–33	72–33	33	50·25	70–25	70–30	70–30	30	42–25	45–20	30	180–30	25	40–25
Total weight, including Breech-gear, tons	27·3	25·4	22·9	24·3	24·5	13·3	4·7	5·5	5·5	7·5	2·26	1·13	0·87	0·36	0·23	0·32
Weight of — Breech Block, lb.	2006	1691	871	851	802	904	390	295	252	313	205	136	83	60	40	40
Weight of — Armour-piercing Projectile, lb.	452	353	353	353	353	238	112	112	112	112	..	..	..	..	..	..
Weight of — " Shell "	..	353	353	353	353	..	..	112	112	112	44	20	15	6	3·3	3·3
Weight of — Common Shell, lb.	452	353	353	353	353	238	112	112	112	112	44	20	15	6	3·3	3·3
Weight of Bursting Charge — Armour-piercing Shell, lb.	..	5·3	5·3	5·3	5·3	..	..	1·7	1·7	1·7	1·7	0·7	0·7	0·25	0·11	0·11
Weight of Bursting Charge — Common Shell, lb.	29·8	24·9	24·9	21·4	21·4	16·5	7·2	7·2	7·2	7·2	2·8	1·3	0·7	0·19	0·14	0·14
Weight of Firing Charge, lb.	191·8	91·5	77·2	83·8	97·0	105·8	41·9	22·0	22·5	34·2	11·3	4·7	4·0	1·3	1·1	1·4
Muzzle Velocity, feet	2018	2362	2362	2477	2641	2018	1854	2297	2297	2690	2362	2362	2625	2297	2346	2723
Muzzle Energy — Total foot-tons	12750	13640	13640	15000	17060	6712	2678	4100	4100	5642	1702	767	737	218	126	170
Muzzle Energy — Per inch circumference, foot-tons	396·4	459·5	459·5	505·4	574·7	259·3	145·2	222·4	222·4	306·1	114·8	71·2	79·5	31·0	21·7	29·3
Perforation at Muzzle, wrought iron, Tresidder's formula, inches	22·8	26·6	26·6	28·6	31·5	18·5	13·2	18·3	18·3	23·2	13·3	10·5	11·7	6·8	5·8	7·2
Perforation Krupp Steel, 3000 yards, inches	6·2	9·1	9·1	9·8	10·7	4·2	3·3	6·2	6·2	7·9	..	..	..	..	..	..

There are also some older 1·46-inch 1-pr. Hotchkiss guns.

Corrected to February, 1913.

DUTCH NAVAL ORDNANCE.

	Krupp Q.F.								
Designation by Calibre, in centimètres	28 Q.F.	24 Q.F.	24 Q.F.	15 Q.F.	15 Q.F.	15 Q.F.	12 Q.F.	10·5 Q.F.	7·5 Q.F.
Calibre, in inches	11·0	9 4	9·4	5·9	5·9	5·9	4·72	4·1	3 0
Total Length, in feet	40·0	31·5	31·5	19·55	19·55	19·55	15·75	18·5	13·5
Length of Rifled Portion of Bore, in inches	..	..	..	..	..	..	..	..	..
Length of Powder Chamber „	..	..	..	..	..	..	..	..	..
Length of Bore, in Calibres	40	37	37	37	37	37	37	50	55
Number of Grooves	..	..	..	..	..	..	..	..	..
Depth of Grooves, inches	..	..	..	..	..	..	..	..	..
Twist of Rifling, in Calibres	..	..	..	..	..	..	..	..	..
Total Weight, in tons	31·0	24·5	24·5	4·83	4·88	5·11	2·40	1·24	1·00
Firing Charge { Armour-piercing Projectile, in lb. / Common Shell „	..	..	..	..	..	..	..	..	..
Weight { Armour-piercing Projectile „ / Common Shell „ / Case Shot „	595·24	374·80	374·80	100	90·38	90·38	52·35	39·68	12·90
Bursting Charge { Armour-piercing Projectile „ / Common Shell „	..	..	..	..	..	..	..	..	..
Muzzle Velocity, feet	2920	2690·5	2789	2221	2444	2789	2221	2900	2945
Muzzle Energy { Total, in foot-tons	15,191	18,809	20,210	3469	3744	4874	1807	..	..
Muzzle Energy { Per inch Circumference, foot-tons	..	..	..	..	.	..	..	..	..
Perforation at Muzzle, in inches (Krupp Steel)	24·25	18·1	19·1	6·5	9·8	11·5	4·7	..	..
Perforation Krupp Steel, 3000 yards	18·50	14	14·2	3·9	5·7	7·1	..	..	..
Model	1909	1900	1905	1899	1900	1905	1899	1912	1910

Corrected to February, 1913. There is a new model of the 28 cm. with muzzle energy of 35,000 ft. tons.

FRENCH NAVAL ORDNANCE.*

Date and Pattern of Gun.	Model 1902.	Model 1893–96.				Model 1893.					Model 1887.				1884.					1881.						
Desig. by Calibre, in cms.	30·5	30·5	27·44	24·0	19·4	34·0	30·5	27·44	24·0	19·4	34	30·5	27	19	34	27	24	16	14	34 long.	34 short.	27	24	16 heavy.	16 light.	14
Calibre, in inches	12·01	12·01	10·8	9·45	7·64	13·39	12·0	10·8	9·45	7·64	13·39	12·0	10·80	7·64	13·39	10·80	9·45	6·49	5·45	13·39	13·39	10·8	9·45	6·49	6·49	5·46
Total length, in feet	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	28·47	24·89	17·04	..	33·69	25·32	27·12	23·70	15·14	15·14	14·3
Length of Bore, in ins.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	380·6	280·2	306·9	269·3	180·9	180·9	162·6
Length of Bore, in cals.	45	40	40	45	45	35	40	40	40	40	42	45	45	45	30	30	30	30	30	28·5	21·0	28·5	28·5	28	28	28
Number of Grooves	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	50	50	42
Depth of Grooves, inches	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0·067	0·067	0·059	0·055	0·039	0·039	0·035
Rifling Twist	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	7°	7°	7°	7°	7°	7°	7°
Total weight, in tons	..	44·4	34·5	23·6	12·5	52·9	45·9	34·9	22·4	10·6	60·0	49·2	37·1	10·6	50·8	27·7	17·9	5·4	3·15	52·2	47·2	27·4	17·7	4·9	3·9	3·2
Weight of Firing Charge: Armour-piercing Projectile, lbs.	..	246	188·5	145½	74	243·0	198·4	114·6	110·2	44·1	220·5	198·4	114·6	44·1	388·0	200·6	..	42·5	..	388·0	337·3	203·9	149·9	42·5	32·6	..
Weight of Firing Charge: Com. Shell lb.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	200·6	..	42·5	27·1	337·3	368·2	203·9	149·9	42·5	32·6	27·1
Weight: Armour-piercing Projectile lb.	750	750	562	375	190	925·9	643·8	476·2	317·5	165·3	925·9	643·8	476·2	165·3	925·9	476·2	317·5	99·2	..	925·9	925·9	476·2	317·5	99·2	99·2	..
Weight: Com. Shell "	..	750	562	375	190	925·9	643·8	476·2	317·5	165·3	925·9	643·8	476·2	165·3	771·6	396·8	264·6	99·2	66·1	771·6	771·6	396·8	264·6	99·2	99·2	66·1
Muzzle Velocity, in f.-s., A.P. Projectile	2870	2650	2650	2870	2870	2400	2625	2625	2625	2625	2560	2625	2625	2625	1969	1969	1969	1969	1969	1969	1804	1969	1969	1969	1821	1936
Muzzle Energy: Total, in f.-t.	42890	36782	27186	21445	10890	36850	30750	22750	15170	7898	42040	30750	22750	7898	24900	12800	8539	2668	1777	24900	20880	12800	8539	2668	2080	..
Muzzle Energy: Per in. circ., f.-t.	..	..	..	..	..	..	815·8	670·7	511·1	329·1	..	815·8	670·7	329·1	591·9	377·5	287·7	130·8	103·9	591·9	496·6	377·5	287·7	130·9	121·3	..
Perforation at Muzzle† wrought iron, inches	46·0	42·7	38·8	37·0	29·0	36·8	37·3	33·7	29·4	23·4	40·8	37·3	33·7	23·4	27·6	22·0	19·2	13·0	10·7	27·6	24·2	22·0	19·2	13·0	11·6	..
Perforation Krupp Steel 3,000 yds.	15½	13½	11½	10½	6¾	11½	11	9	7½	5½	13	11	9	5½	7½	6	5¼	3	..	7½	7	6	5¼	3	..	..

* Official particulars are unattainable, 1913. The 13·4 in. 45-calibre gun of the new ships weighs 66 tons, and the projectile 1190 lb. The muzzle energy is 65,340 foot-tons, and the penetration at 9000 mètres (9842 yds.) is 11·8 in. of Krupp steel. The bursting charge is said to be 55 lb. of mélinite. † By Tresidder's formula.
A new type of the 1902 Model has been tried with 7·6-in. and 6·4-in. calibre. These will probably be replaced by model of 1906, 12-in. 970 lb. projectile, velocity 2840 f.-s., and 9·4-in. 220 lb. projectile, velocity 2840 f.-s

FRENCH NAVAL ORDNANCE—*continued.*

Date and Pattern of Gun.	16·47.*	Q.F. Guns. Mod. 93-6. 16·47	16§	16‡	14§	14‡	Mod. 92. 10	Mod. 91. 10	Mod. 81. 10‡
Desig. by Calibre, in cms.	16·47	16·47			13·86		10·00		
Calibre, in inches	6·46	6·46			5·44		3·94		
Total length, in feet	26·9								
Length of Bore, in inches	..								
Length of Bore, in calibres	47·5	45	45	30	45	30	55	45	26
Number of Grooves	..								
Depth of Grooves, inches	..								
Rifling Twist	..								
Total weight, in tons	8·5	8·1	6·89	4·92	4·13	3·84	2·19	1·62	1·18
Weight of Firing Charge — Armour-piercing Projectile, lb.	..	44	30·2	19·0	16·1	12·8	8·16	8·16	5·07
Weight of Firing Charge — Common Shell, „	..								
Weight — Armour-piercing Projectile, lb.	115	115	99·21		66·14		30·87		
Weight — Common Shell, „	..	115	99·21		66·14		30·87		
Muzzle Velocity, in ft.-secs.	3110	2870	§2625	2100	2625	2100	2500	2428	1840
Muzzle Energy — Total, in foot-tons	7185	6568	4730	3061	3160	2022	1340	1266	725
Muzzle Energy — Per in. circ. foot-tons	..	..	233·5	150·9	184·9	118·7	..	..	..
Perforation at Muzzle, wrought iron, inches	26·3	24·5†	20·0†	14·4†	17·7†	12·7†	13·0†	12·5†	8·2†
Perforation Krupp steel, 3,000 yards	5¾	5¼	4	..	..	..	..	..	..

* Experimental gun not in service. † By Tresidder's formula. ‡ Models 1881 and 1884 converted guns.
§ There are three models of the years 1887, 1891 and 1893, of slightly different weights from the above.

ITALIAN NAVAL ORDNANCE.

	Armstrong Breech Loading.					Q.F.	Armstrong B.L.	Armstrong Quick-Firing.			
Designation by Calibre, in centimètres	43·1†	43·1† Early Pattern. 1882.	34·3	30·5	25·4	20·3	15·2	15·2	15·2	12·0	7·6
Calibre, in inches	17	17	13·5	12	10	8	6	6	6	4·7	3·0
Length — Total, in feet	40·75	39	36·09	41·5	34·8	31	16·9	20·9	20·9	16·2	10·26
Length — Rifled Bore, in inches	346·8	315·7	409·4	479·9	400	360	194	239·6	239·6	189	119·6
Length — Powder Chamber, in inches	84·5	98	67·2	92·1	55·1	47·4	37·7	37·7	37·7	15·9	15·8
Length — Bore, in Calibres	27	26	30	40	40	45	32	40	40	40	40
No. of Grooves	82	82	56	48	42	32	28	28	28	22	16
Twist of Rifling, in Calibres	50	50	35	30	30	30	30	30	30	34·4	30
Total Weight, in tons	104·3	101·5	67·9	51·77	30	19·09	5·4	5·7	6·5	2·05	0·6
Firing Charge — Armour-piercing projectile, lb.	900·0	725	630·5	235·6	231	58·9	46	46	17·6*	5·7	2·2
Firing Charge — Common Shell, „	600	480	313	117·7	116·5	29·32	33·7	15·3	6·5	1·85	1·1
Weight — Armour-piercing projectile, „	2000	2000	1250	850	448	250	98	100	100	45·0	12
Weight — Common Shell, „	2000	2000	1250	880·6	456·3	256·2	102·3	102·3	102·3	44·9	13·9
Weight — Shrapnel „, „	2017	2017	1250	..	405·6	..	104·7	104·7	104·7	44·9	..
Weight — Case Shot, „	2007	2007	1217	887·6	449·7	256·2	99·6	99·6	99·6	44·9	13·9
Bursting Charge — Armour-piercing projectile, „	32	32	17·4	10·7	7·1	2·23	2·0	5·1	4·4	..	..
Bursting Charge — Common Shell, „	60	60	31	56	19·8	7·5	5·0	5·0	5·0	·88	·66
Bursting Charge — Shrapnel „, „	5	5	4·25	..	1·5	..	·66	·66	·66	·24	..
Muzzle Velocity, in ft.-secs.	1992	1935	2016	2500	2460	2600	1952	2149	2297	2180	2625
Muzzle Energy — Total, foot-tons	55,030	51,930	35,230	36,925	18,798	11,730	2577	3169	3622	1490	573
Muzzle Energy — Per inch circumference, foot-tons	1035	976·3	830·8	..	..	..	..	..	..	..	..
Perforation at Muzzle, inches of iron by Tresidder's formula	36·7	35·0	33·0	40·0	31·0	28·3	13·2	15·4	17·0	12·4	10·2
Perforation Krupp Steel, 3000 yds., inches	12½	12	11	13	9	7	..	..	3½	..	..

* Ballistite. † There are four types of these old guns, viz., Lauria, Lepanto, Italia, Morosini.

Note.—There is also a 6-inch quick-firing gun, 40 cals. M.V., 2600 f.s.

The weight of Ballistite charges is not known, but it is understood that they give the same ballistics as the powder charges shown.

Corrected to March, 1913.

NAVAL ORDNANCE OF NORWAY.

	Modern Guns.							
Designation by Calibre, in cms.	21	21 Q.F.	15	15 Q.F.	12 Q.F.	76 mm.	76 mm.	7 cm.
Calibre, inches	8·24	8·24	5·87	5·87	4·7	3·0	3·0	2·8
Total Length, feet	24·0	31·2	19·6	23·3	17·7	10·3	13·3	9·2
Length { Rifled Portion of Bore, inches	212·3	309·7	178·0	234·1	179·2	102·4	127·7	81·8
Length { Chamber, inches	49·0	48·6	39·0	32·9	26·0	15·4	20·4	19·1
Length { Bore in calibres	35·0	43·8	37·2	45·8	44·0	40	50	36·6
Number of Grooves	64	32	44	28	26	16	28	28
Twist of Rifling	46–23	∞–30	45–25	∞–30	∞–30	∞–30	30	20
Total Weight, tons	14·2	18·9	5·6	7·1	2·7	0·6	1·0	0·63
Weight of { Armour-piercing Shell, in lb.	309	309	112·4	99·3	45	12·5	12·5	10·5
Weight of { Common Shell, in lb.	..	..	..	..	..	..	..	..
Weight of* Firing Charge { Armour-piercing Shell, in lb.	45·6	54	20·4	20·9	9·4	2·2	3·75	2·2
Weight of* Firing Charge { Common Shell, in lb.	..	..	..	..	..	..	..	..
Muzzle Velocity, feet	1903	2300	2050	2625	2570	2200	2840	2230
Muzzle Energy, Total foot-tons	7760	11450	3328	4870	2060	430	695	367
Perforation through Iron by Tresidder's formula	19·3	25·6	15·4	21	15·3	8·0	11·6	7·8
Perforation, Krupp Steel, 3000 yards	4¾	6½	3¼	4	..	..	..	..

* Smokeless powder. Corrected to February, 1913.

RUSSIAN NAVAL ORDNANCE.

	Heavy Guns.			Q.F. Guns.		
Calibre, in inches	12	10	8	6	4·7	12-pdr.
Weight, in tons	43	22	12	5½	3	0·9
Length, in calibres	40	45	45	45	45	50
Weight of Projectile, in lbs.	730	450	192	91	46	12
Muzzle Velocity, foot-seconds	2600	2275	2950	2600	2700	2700
Perforation, in inches, of Wrought Iron — At Muzzle	38	35	27	22½	15½	10·2
Perforation, in inches, of Wrought Iron — At 2000 yards	30	27	20	13	9	4·8
Perforation of Krupp Steel at 3000 yards	16	12	8½	3¾	3	..

There exists a new pattern 12-in. gun of 50 calibres with 714 lb. projectile, 3000 ft. muzzle velocity, and penetration of Krupp steel at 3000 yds. of 20 in., also 10-in. gun of 50 calibres, 8-in. gun of 50 calibres, and 4·7-in. gun of 50 calibres (Vickers), details of which are not published.

Corrected to February, 1913.

SPANISH NAVAL ORDNANCE.

—	Hontoria.—Pattern 83.—Breech Loading.						Canet.		Skoda.			Krupp.	Vickers.		Maxim Norden-felt.	Nordenfelt.		Sar-miento (·)	Hotchkiss.			Maxim Norden-felt.
Designation by Calibre, in m/m	320	280	240	200	140	120	150	140	150	70	47	105	101·6	75	75	57	42	42	57	37	37	37
Length: Total length, in m/m	11780	10310	10200	7360	5303	4420	7500	6300	5960	2743	2048	3680	5240	1222·9	3500	2651	1935	1946	2480	842	1134	1105
Length: Powder Chamber, in m/m	2113·5	1845	1698·3	1695	1030	886	1124	1078·5	915	..	397·05	750	635·23	111	632·20	345·78	353	525·6	256	129	627	394·6
Length: Bore, in m/m	11180	9787	8387	7095	4879	4173	7250	4893·2	5540	2550	1881	3375	5100	934·74	3200	2413	1750	1806	2280	713	740	980·9
No. of Grooves	80	70	60	50	34	30	48	36	44	24	20	32	32	32	30	24	18	20	24	12	12	12
Depth of Grooves, in m/m	1·5	1·5	1·25	1·25	1·00	1·00	1·00	1·00	1·5	0·75	1·20	1·25	1·00	0·75	0·58	0·305	0·305	0·3	0·3	0·37	0·4	0·4
Twist of Rifling, in m/m and degrees	9600	8400	7200	6000	4200	3600	6°	4902·5	..	..	..	..	3048	1919·02	2250	1710	6°	1260	6°	1·107	1·131	1·110
Weight of the empty projectile: Armour-piercing proj., in kgs.	472·20	315·0	198·0	114·6	39190	24100	39500	39190	44350	3878	1440	..	13920	5670	6410	2605	1093	1093	2546	0·488	0·488	0·409
Weight of the empty projectile: Common Shell, in kgs.	398·60	265·60	167·00	98·00	34946	21400	38·00	34946	40445	3770	1440	17400	12620	5600	6390	2633	1108	1108	2574	0·407	0·407	0·409
Weight of the empty projectile: Ring Segment, in kgs.	402·30	268·00	168·50	99·00	33835	21600	..	33835	44990	3760	..	..	..	..	..	..	..	..	..	..	..	..
Weight of the empty projectile: Semi-piercing, in kgs.	399·86	363·109	167·00	98207	34260	20043	..	34260	..	..	..	..	12920	..	..	..	..	..	..	..	..	..
Weight of the empty projectile: Case Shot, in kgs.	..	..	..	..	..	..	..	..	..	..	..	..	..	6000	..	2224	1264	1264	2240	0·616	0·616	..
Weight of the explosive charge: For the Armour-piercing, in kgs.	7500	5000	3000	1900	0·512	0·340	0·500	0·512	0·860	0·122	0·060	..	0·500	0·230	0·227	0·078	0·038	0·038	0·115	0·015	0·015	0·013
Weight of the explosive charge: " Common Shell, in kgs.	21000	14000	9000	5000	1695	0·950	1430	1695	4225	0·230	0·060	0·350	1350	0·260	0·250	0·065	0·038	0·038	0·085	0·022	0·022	0·013
Weight of the explosive charge: " Ring Segment, in kgs.	17500	12000	7500	4000	1216	0·800	..	1216	0·445	0·240	..	..	..	..	..	..	..	..	..	..	..	..
Weight of the explosive charge: " Semi-piercing, in kgs.	..	..	..	..	..	..	..	..	..	..	..	..	1061	..	..	..	..	..	..	..	..	..
Muzzle Velocity, in metres	620	620	647·1	620	580	612	800	736	690	710	710	600	884	300	641	570	603	590	670	404	404	549
Muzzle Energy, in metre-tons	9408	6275·9	4400	2290	679·8	469	1309	1094·7	1098	102·9	38·5	326	574·9	27	139·1	45	21·6	20·2	42·5	4	4	6·4

Corrected to April, 1913.

The 12-in. 50-calibre Armstrong gun in the new ships fires a projectile of 249 lb., with muzzle velocity of 29,530 ft., and muzzle energy of 51,600 foot-tons.

NAVAL ORDNANCE OF SWEDEN.

N. = belongs to the Navy.
C.A. = belongs to the Coast Artillery.

—	Bofors.	Armstrong.		Canet and Bofors.	Arm-strong.	Whit-worth.	Bofors.		Bofors.		
	28 cm.k. m/12	25 cm.k. m/85	25 cm.k. m/89	25 cm.k. m/94	24 cm.k. m/90	24 cm.k. m/92	24 cm.k. m/96	24 cm.k. m/04	21 cm.k. m/98	15 cm.k. m/98	15 cm.k. m/03 and m/12
	N.	C.A.	C.A.	N.	C.A.	C.A.	C.A.	C.A.	N.	N.C.A.	N.C.A.
Designation by Calibre, in cms.	28·3	25·4	25·4	25·4	24	24	24	24	21	15·24	15·24
Total Length . . . mm.	12735	8636	8636	10670	8237	8544	10320	12000	9335	6768	7620
Length: Rifled Portion of Bore . mm.	10515	6637	6550	8498	6353	6618	8541	10009·3	7801·1	5693	6265·9
Length: Chamber	1660	1397	1397	1609	1209	1373·1	1299·6	1508·4	1123	787·7	1049·9
Length: Bore, in calibres	44	32	32	40·5	32·4	33·5	41	48	42·5	42·5	48
Number of Grooves	80	42	42	44	42	40	40	40	60	44	44
Twist of Rifling	28	40	40	30	30	30	30	30	30	30	30
Total Weight . . . tons	43·5	30·25	31·03	29·2	23·84	28·1	25	30·44	17·00	5·98	7·75
Weight: Armour-piercing Shell, in kg.	305	204	204	204	181	215	215	215	125	45·4	45·4
Weight: Common Shell . . kg.	—	182	182	182	181	215	215	—	—	—	—
Weight of Firing Charge: Armour-piercing Shell, in kg.	100	41	41	45·2	34	45·5	43	53	30	10·3	15
Weight of Firing Charge: Common Shell . . kg.	—	31·5	31·5	—	—	—	—	—	—	—	—
Muzzle Velocity . . . m.	870	640	640	720	625	640	685	785	750	750	850
Muzzle Energy, total m. ton.	—	4258	4258	5386	3609	4209	5138	6575	3581	1301	1671
Perforation (K.C. armour, 3000 m.), in cms.	—	14·6	14·6	20·6	13·4	19·0	21·8	35·9	22·9	10·4	15·7

—	Bofors.	Bofors.	Stockholms Vapenfabrik and Finspong.		Bofors.	Fin-spong.	Stockholms Vapenfabrik.		Fin-spong.	Stockholms Vapenfabrik.	
	12 cm.k. m/94 and m/97	12 cm.k. m/03 and m/11	7·5 cm.k. m/05 and m/12	5·7 cm.k. m/89 B and m/99	5·7 cm.k. m/92	5·7 cm.k. m/95 ⊙ B1/95B	5·7 cm.k. m/95 C.	5·7 cm.k. m/95 D.	4·7 cm.k. m/92	4·7 cm.k. m/95	3·7 cm.k. m/98 B
	N.C.A.	C.A.	N.	N.C.A.	N.C.A.	C.A.	C.A.	N.	C.A.	N.	N.C.A.
Designation by Calibre, in cms.	12	12	7·5	5·7	5·7	5·7	5·7	5·7	4·7	4·7	3·7
Total Length . . . mm.	5400	6000	3970	3108	2760	1478	1504	1100	1200	2572	1450
Length: Rifled Portion of Bore . mm.	4665	5013	3129	2517·5	2328	1049·5	1049·5	1447·5	817·3	2034·5	1126
Length: Chamber	474	742	560·5	265	229	205	205	200	175	2572	133·4
Length: Bore, in calibres	43	48	49	49	41·5	22	23	30	22	49	34
Number of Grooves	36	36	28	24	24	24	24	24	24	20	16
Twist of Rifling	30	30	30	30	30	25	25	27	25	30	30
Total Weight . . . tons	2·8	3·7	0·950	0·380	0·334	(0·216) (0·206)	0·212	0·189	0·116	0·243	0·0773
Weight: Armour-piercing Shell, in kg.	21	21	—	—	—	—	—	—	—	—	—
Weight: Common Shell . . kg.	21	21	6·5	2·722	2·722	2·723	2·722	2·722	1·5	1·5	0·8
Weight of Firing Charge: Armour-piercing Shell, in kg.	4·3	7·0	—	—	—	—	—	—	—	—	—
Weight of Firing Charge: Common Shell . . kg.	4·3	7·0	1·3	0·435	0·34	0·24	0·24	0·365	0·143	0·3	0·08
Muzzle Velocity . . . m.	740	860	780	704	640	485	485	600	468	740	550
Muzzle Energy, total m. ton.	586	791	201	68·7	56·8	32·64	32·64	49·9	16·73	41·80	12·3
Perforation (K.C. armour, 3000 m.), in cms.	—	10·5	—	—	—	—	—	—	—	—	—

Corrected to February, 1913. For the 11-in. and 12-in. guns, and details of some of the others, see the Bofors Company's table, *post*.

UNITED STATES NAVAL ORDNANCE.

GUN.	MARK.	Length in Calibres.	Total Length.	Capacity of Chamber in Cubic Inches.	Travel of Projectile in Inches.	Weight of Gun.	Weight of Projectile.	Weight of Charge.	Muzzle Velocity.	Muzzle Energy.	Penetration at Muzzle, Krupp Armour, using Capped Projectile.	At 3000 Yards.		At 6000 Yards.		At 9000 Yards.	
												Remaining Velocity.	Penetration.	Remaining Velocity.	Penetration.	Remaining Velocity.	Penetration.
			inch.			tons.	lb.	lb.	ft.-seconds.	ft.-tons.	inch.	ft.-seconds.	inch.	ft.-seconds.	inch.	ft.-seconds.	inch.
3-in. B.F.G.	II., III.	50	154	219	128·3	0·9	13	3·85	2700	658	3·3	1230	1·2	848	0·8	..	..
3-in. S.A.	V., VI.	50	159	219	128·3	1·0	13	3·85	2700	658	3·3	1230	1·2	848	0·8	..	..
4-in. R.F.G.	III., IV., V., VI.	40	164	331	134·5	1·5	33	4·85	2000	915	3·4	1156	1·7	897	1·2	..	..
4-in. R.F.G.	VII.	50	205	652	168·3	2·6	33	9·0	2500	1,430	4·6	1432	2·2	979	1·4	853	1·2
4-in. R.F.G.	VIII.	50	205	652	168·3	2·9	33	12·3	2800	1,794	5·3	1627	2·6	1033	1·5	878	1·2
5-in. R.F.G.	II., III., IV.	40	206	656	165·8	3·1	50	10·0	2300	1,852	5·3	1286	2·6	934	1·7	829	1·4
5-in. B.L.R.	V., VI.	50	256	1,200	215·6	4·6	60	19·2	2700	3,032	6·2	1692	3·5	1102	2·0	928	1·6
5-in. B.L.R.	VI.	50	256	1,200	215·6	4·6	50[1]	20·5	3000[1]	3,122	6·4	1732	3·2	1057	1·7	877	1·4
5-in. R.F.G.	VII.	51	261	1,135	215·6	5·0	50	23·8	3150	3,439	6·8	1835	3·4	1091	1·8	895	1·4
6-in. R.F.G.	II., III.	30	196	1,287	150·0	4·8	105	18·8	1950	2,768	5·3	1305	3·2	1009	2·3	909	2·0
6-in. R.F.G.	IV., VII.	40	256	1,320	205·8	6·0	105	18·8	2150	3,365	6·0	1440	3·6	1058	2·4	934	2·1
6-in. B.F.G.	IX.	45	270	1,320	221·7	7·0	105	18·8	2250	3,685	6·3	1511	3·8	1086	2·5	948	2·1
6-in. B.L.R.	VI	50	300	2,101	247·5	8·3	105	30·0	2600	4,920	8·6	1770	4·7	1207	2·9	996	2·2
6-in. B.L.B.	VIII.	50	300	2,101	247·5	8·6	105	37·0	2800	5,707	11·3	1923	5·2	1297	3·2	1026	2·3
7-in. B.L.R.	II.	45	323	3,643	259·8	12·7	165	58·0	2700	8,338	9·6	1948	6·4	1382	4·2	1083	3·0
8-in. B.L.R.	III., IV.	35	305	3,170	245·8	13·1	260	43·8	2100	7,948	8·6	1576	6·0	1206	4·2	1040	3·6
8-in. B.L.R.	V. and VI.	45	369	5,243	299·1	18·7	260	98·5	2750	13,360	12·0	2106	8·6	1589	6·1	1227	4·4
10-in. B.L.R.	I., II.	30	329	6,779	251·1	25·1	510	90·0	2000	14,141	10·7	1590	8·0	1274	6·1	1103	5·0
10-in. B.L.R.	III.	40	413	10,222	327·0	34·6	510	207·5	2700	25,772	19·4	2184	11·9	1747	9·0	1406	6·9
12-in. B.L.B.	I., II.	35	441	11,991	345·2	45·3	870	160·0	2100	26,596	14·2	1733	11·2	1433	8·8	1219	7·2
12-in. B.L.R.	III., IV.	40	493	17,096	392·2	52·1	870	237·5	2400	34,738	19·8	1994	13·3	1649	10·5	1376	8·3
12-in. B.L.R.	III., IV.	40	493	17,096	392·2	52·1	870	305·0[2]	2600[2]	40,768	18·5	2171	14·8	1801	11·7	1500	9·3
12-in. B.L.R.	V.	45	553	16,974	452·0	52·9	870	305·0	2700	43,964	19·4	2259	15·5	1877	12·3	1561	9·8
12-in. B.L.B.	VI.	45	553	14,970	452·0	53·6	870	340·0[3]	2850[3]	48,984	20·8	2393	16·6	1991	13·3	1653	10·6
12-in. B.L.B.	VII.	50	607	14,296	506·3	56·1	870	340·0[3]	2950[3]	52,483	25·7	2483	17·5	2071	13·9	1719	11·0
13-in. B.L.B.	I., II.	35	479	15,068	374·9	61·4	1130	180·0	2000	31,333	15·0	1679	12·0	1414	9·7	1221	8·1
14-in. B.L.B.	I.	45	642	..	..	63·6	1400	365·0	2600	65,606	28·3*	..	23·4*	..	..	..	..

* Harveyized armour.

Corrected to March, 1913.

ELSWICK B.L. AND Q.F. GUNS AND HOWITZERS.

This Table is supplied by the Manufacturers.

GUNS.

		Semi-Automatic			Semi-Automatic		Naval Landing.			Semi-Automatic	Jointed Gun.
Diameter of Bore ....ins.	1·85	1·85	1·85	2·24	2·24	2·953	3	3	3	3	3
do. do. ....mm.	47	47	47	57	57	75	76	76	76	76	76
Length of Bore ....cals.	40	46	50	40	50	14·13	18·8	40	50	50	19·2
	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.
Weight of Gun	4·51	5·0	7·5	7·5	10·5	1·875	4	12	17·75	23	4·5
do. do. ....kilos.	230	254	381	381	533	95	203	609	901	1168	229
do. Projectile ....lbs.	3·3	3·3	3·3	6	6	11·75	12·5	12·5	12·5	14·33	14·33
do. do. ......kilos.	1·5	1·5	1·5	2·722	2·722	5·33	5·67	5·67	5·67	6·5	6·5
	oz.	oz.	lb. oz.	oz.	lb. oz.	oz.	oz.	lb. oz.	lb. oz.	lb.	ozs.
do. Charge, M.D. Cordite	8·25	10·0	1 0	10	1 2 5	7·75	15	2 0	3 0	5·75	15
do. do. do. kilos.	0·234	0·283	0·453	0·283	0·525	0·22	0·369	0·907	1·36	2·608	0·425
Muzzle Velocity ....f.s.	2132	2300	2680	1968	2400	1100	1585	2210	2600	3050	1485
do. do. ......m.s.	650	701	817	600	731	335	483	674	792	930	452
Muzzle Energy ....f.t.	104	121	164	161	240	98	213	423	586	922	218
do. do. ....m.t.	32·2	37·5	50·8	49·8	74·3	30·3	66	131	181·5	285·5	67·5
Penetration at Muzzle ...ins. (Tressider Wrought Iron Pl.)	5·15	5·8	7·3	5.4	7·3	..	..	8·0	10·3	13 7	..
do. do. ...mm.	130·8	147·3	185·4	137·2	185·4	..	..	203·2	261·6	348·0	..
Rounds per Minute	25	25	25	25	25	20	20	20	20	30	15

Diameter of Bore ....ins.	4	4	4·7	4·7	4·7	6	6	6	7·5	7·5	8	8	9·2	9·2	10	10	10
do. do. ....mm.	102	102	120	120	120	152	152	152	190	190	203	203	234	234	254	254	254
Length of Bore ....cals.	40	50	40	45	50	40	45	50	45	50	45	50	45	50	40	45	50
	cwts.	cwts.	cwts.	cwts.	cwts.	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons
Weight of Gun	26	42	42	53	66	6·6	8·4	8·75	13·8	15 75	18·0	20·4	26·75	28·82	31	36·25	38·25
do. do. ....kilos.	1321	2134	2134	2692	3353	6706	8535	8890	14021	16003	18289	20727	27179	29289	31497	36832	38864
do. Projectile ....lbs.	31	31	45	45	45	100	100	100	200	200	250	250	380	380	450	500	500
do. do. ......kilos.	14·06	14 06	20 41	20·41	20·41	45·36	45·36	45 36	90·72	90·72	113·4	113·4	172·37	172·37	204·12	226·8	226·8
	lb.	lb.	lb.	lb. oz.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
do. Charge, M.D. Cordite	5·5	10·5	6·125	9 11	14	24	31	33·0	74	76	80	90	122	136	86·5	167	200
do. do. do. kilos.	2·495	4·76	2·78	4·395	6 35	10·886	14·061	15·0	33·566	34·473	36·29	40·82	55 34	61·7	39·24	75·75	90·72
Muzzle Velocity ....f.s.	2300	3000	2200	2600	3000	2500	2800	3000	2900	3000	2845	3000	2750	3000	2400	2800	3000
do. do. ......m.s.	701	914	670	792	914	762	853	914	884	914	867	914	838	914	731	853	914
Muzzle Energy ....f.t.	1137	1934	1510	2109	2808	4334	5436	6240	11663	12481	14031	15600	19926	23714	17973	27181	31203
do. do. ....m.t.	352·1	599	467·6	653	869·6	1342·2	1683·4	1932	3611·9	3865·2	4345·2	4831·2	6171	7340	5566	8418	9663
Penetration at Muzzle ...ins. (Tressider Wrought Iron Pl.)	11·6	17·4	12·1	15·6	19·3	19·4	22·9	25·5	30·6	32·3	32·2	34·9	35·2	40·1	29·9	39·7	44·1
do. do. ...mm.	294·6	442·0	307·3	396·2	490·2	492·8	581·6	647·7	777·2	820·4	817·9	886·4	894·1	1018·5	759·4	1008·4	1120·1
Rounds per Minute	12	12	12	12	12	9	9	9	6	6	5	5	4	4	3	3	3

Diameter of Bore ....ins.	12	12	12	12	13·5	14	16
do. do. ....mm.	305	305	305	305	343	355·6	406·4
Length of Bore ....cals.	40	40	45	50	45	45	40
	tons	tons	tons	tons	tons	tons	tons
Weight of Gun	48·5	51	59·3	66·7	76	85	105
do. do. ....kilos.	49278	51818	60252	67770	77216	86360	106680
do. Projectile ....lbs	850	850	850	850	1250	1400	2200
do. do. ......kilos.	385·55	385·55	385·55	385·55	567	635	998
	lb.	lb.	lb.	lb.	lb.	lb.	lb.
do. Charge, M.D. Cordite	155	260	260	285	296	324	390
do. do. do. kilos.	70·31	117·93	117·93	129·3	134·26	147	177
Muzzle Velocity ....f.s.	2400	2650	2800	3000	2700	2700	2340
do. do. ....m.s.	731	808	853	914	823	823	713
Muzzle Energy ....f.t.	33949	41386	46208	53046	63187	70770	83530
do. do. ....m.t.	10513	12816	14310	16428	19568	21916	25868
Penetration at Muzzle ...ins. (Tressider Wrought Iron Pl.)	37·5	43·6	47·3	52·5	51·3	53·2	50·4
do. do. ...mm.	952·5	1107·4	1201·4	1333·5	1303·0	1351·3	1280
Rounds per Minute	2	2	2	2	2	2	2

HOWITZERS AND FIELD GUNS.

	Mountain Gun.	Field.	Horse and Field.	Field.	Howitzers.			Field Position.	Howitzers.							
Diameter of Bore ... ins.	2·953	3	3	3·3	4	4·3	4·7	5	5	6	8	9·2	11	11·24	12	
,, ,, ... mm.	75	76	76	84	102	109·2	120	127	127	152	203	234	279·4	285·5	305	
Length of Bore ... calibres	15·2	28	23	28	8·75	12·5	12	32	8·4	12·2	12	13·7	12	15	17	
	lb.	cwt.	cwt.	cwt.	lb.	cwt.	cwt.	tons	cwt.	ton	tons	tons	tons	tons	tons	
Weight of Gun	260	7·25	6	9	220	7	8	2	9	1	2·6	4·3	5·5	7·85	12·55	
,, ,, ... kilos.	118	368	305	457	100	356	406	2032	457	1016	2642	4369	5588	7976	12751	
,, Projectile lbs.	12·5	14·3	12·5	18·5	20	40	35	60	50	100	240	290	500	661·38	981	771
,, ,, kilos.	5·67	6·49	5·67	8·39	9·07	18·14	15·87	27·22	22·68	45·36	108·9	131·5	227	300	445	350
	oz.	oz.	lb. oz.	lb. oz.	oz.	oz.	lb. oz.	lb. oz.	oz.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
,, Charge M.D. Cordite	10	20½	1 4	1 6	8½	16¼	1 4½	9 8	12	3	7·5	14	20	32	53	56·25
,, ,, ,, kilos.	0·283	0·582	0·567	0·624	0·241	0·461	0·582	4·31	0·34	1·361	3·4	6·35	9·07	14·51	24	25·51
Muzzle Velocity ... ... f.s.	1250	1755	1700	1635	950	980	1150	2150	782	1000	1000	1250	1220	1230	1350	1585
,, ,, ... m.s.	381	535	518	498	290	298	350	655	238	305	305	381	372	375	411·5	483

Corrected to March, 1913.

VICKERS, SONS & MAXIM'S GUNS AND MOUNTINGS.

This Table is supplied by the Manufacturers.

	37 m/m	37 m/m	3-pdr.	6-pdr.	3-in. Semi-Auto.	4-in. Semi-Auto.	4-in. Semi-Auto.	4·7-in. Semi-Auto.	4·7-in. Semi-Auto.	4·7 Naval Howitzer.	6-in. Semi-Auto.	6-in. Semi-Auto.
	30 cal.	42·5 cal.	50 cal.	50 cal.	50 cal.	40 cal.	50 cal.	45 cal.	50 cal.	18 cal.	45 cal.	50 cal.
Diameter of Bore . .ins.	1·457	1·457	1·85	2·244	3	4	4	4·724	4·724	4·724	6	6
Length of Bore . .ins.	43·5	62	92·5	112·2	150	160	201·15	212·6	228·45	85	269·5	300
Length of Gun . .ins.	73·75	94	98·9	118·6	156·995	166·6	208·45	220	236·2	89·9	279·2	310·07
Weight of Projectile lbs.	1	1·25	3·3	6	12·5	31	31	45	45·14	45	100	100
Weight of Gun . . .	cwts. 3·75	cwts. 5·42	cwts. 5.53	cwts. 9·29	cwts. 19	cwts. 25	cwts. 41	tons. 3·18	tons. 3·2	c. q. l. 11 1 14	tons. 7·42	tons. 7·8
Muzzle Velocity . .f.s.	1800	2300	2800	2600	2700	2300	3030	2800	3050	1200	2900	3100
Muzzle Energy . .f.t.	22·5	45·85	179·4	281	632	1137	1975	2445	2910	450	5830	6665
Penetration of Wrought Iron Plate at Muzzle. Gavre formula . .ins.	1·9	3·3	6·7	7·5	9·65	10·8	16	15·9	17·8	—	22·6	24·8
Penetration of Hard Steel Plate at 3000 yards. Gavre formula . .ins.	—	—	—	—	—	—	—	—	5·0	—	7·8	8·8
Rounds per minute . .	300	300	30	28	25	20	15	12	12	10	10	10
Weight of Mounting complete with Shield . .	c. q. l. 4 1 10	c. q. l. 4 3 20	c. q. l. 11 2 0	c. q. l. 18 1 0	t. c. q. l. 1 1 1 0	t. c. q. l. 1 10 2 0	t. c. q. l. 2 6 3 0	t. c. q. l. 3 13 3 0	t. c. q. l. 6 5 3 0	t. c. q. l. 4 8 1 11	t. c. q. l. 9 1 1 0	t. c. q. l. 12 0 2 0
Thickness of Shield . .	·1875	·16	ins. ·25	ins. ·25	ins. ·25	ins. ·028	none	ins. 2 & ·313	ins. 4·33	ins. 2	ins. 3	ins. 3 & 1·5
Weight of Shield . . .	c. q. l. 0 3 11	c. q. l. 0 1 22	c. q. l. 1 0 0	c. q. l. 1 2 8	c. q. l. 2 1 0	c. q. l. 1 1 0	none	c. q. l. 17 0 0 1 1 0	t. c. q. l. 2 8 2 0	t. c. q. l. 1 9 1 14	t. c. q. l. 3 1 1 0	t. c. q. l. 5 5 0 0
Angle of Elevation . .	16°	15°	20°	20°	20°	20°	15°	20°	16°	70°	15°	15°
Angle of Depression . .	25°	20°	20°	10°	10°	10°	10°	7°	7°	5°	7°	7°

	7·5-in. Semi-Auto.	7·5-in. Semi-Auto.	8-in. Semi-Auto.	9·2-in. Semi-Auto.	9·2-in. Semi-Auto.	10-in. Semi-Auto.	10-in. Semi-Auto.	12-in. Semi-Auto.	12-in. Semi-Auto.	13·5-in. Semi-Auto.	14-in. Semi-Auto.		15-in. Semi-Auto.	
	45 cal.	50 cal.	50 cal.	45 cal.	50 cal.	45 cal.	50 cal.	45 cal.	50 cal.	45 cal.	45 cal.		45 cal.	
Diameter of Bore . .ins.	7·5	7·5	8	9·2	9·2	10	10	12	12	13·5	14		15	
Length of Bore . .ins.	337·5	375	388·75	429·3	460	450	486	540	600	607·5	630		675	
Length of Gun . .ins.	349·2	386·7	4(0	442·35	473	464·6	500	557·55	617·7	625·9	648·4		695·3	
Weight of Projectile lbs.	200	200	216·7	380	380	478·4	496·6	850	850	1250	1400	1488·12	1720	1950
Weight of Gun . . .	tons. 14·62	tons. 16·0	tons. 14·6	tons. 26·85	tons. 27·81	tons. 34·85	tons 28 7	tons 57·7	tons 65·85	tons 76·125	tons 80·25	tons 80·25	tons 96	tons 96
Muzzle Velocity . .f.s.	2875	3003	3(90	2800	2950	2850	2863	2850	3010	2760	2615	2525	2655	2500
Muzzle Energy . .f.t.	11465	12505	14350	20660	22930	26945	28225	47875	53400	63190	66385	65790	84070	84510
Penetration of Wrought Iron Plate at Muzzle. Gavre formula . .ins.	28·75	30·75	31·5	35·3	38·0	38·9	40·2	48·3	52·1	52·8	52·0	51·5	57·2	57·5
Penetration of Hard Steel Plate at 3000 yards. Gavre formula . .ins.	10·6	11·4	12·6	14·1	15·2	15·8	16·4	21·0	22·2	22·8	22·9	22·6	25·1	25·5
Rounds per minute . .	8	8	6	4	4	3	3	2	2	1·5	1·35	1·35	1·2	1·2
Weight of Mounting complete with Shield . .	t. c. q. l.	t. c. q. l.												
Thickness of Shield . .	Depending on type of Mounting.													
Weight of Shield . . .														
Angle of Elevation . .														
Angle of Depression . .														

HOWITZERS AND FIELD GUNS.

	3-in. Mountain Gun.	3-in. Landing Gun.	3-in. Field.		Howitzers.					
			Light.	Heavy.	4·33-in.	4·7-in.	6-in.	8-in.	9·2-in.	11-in.
Diameter of Bore . .ins.	3	3	3	2·95	4·33	4·724	6	8	9·2	11
Length of Bore . .ins.	42·94	66	64·96	99·46	58·45	66·15	94·5	128·8	128·8	154
Length of Gun . .ins.	47·23	70·34	69·3	103·8	63·55	71·05	102·8	138·2	141·2	168·25
Weight of Projectile lbs.	12·5	12·5	12·5	14·33	35·25	45	90·3	216·7	290	758
Weight of Gun . cwts.	2·45	3·9	4·5	7·5	7·25	9·75	18·75	46·75	tons ·3	tons 5·85
Muzzle Velocity . .f.s.	1150	1640	1600	1660	1100	1000	1285	1100	1300	1000
Muzzle Energy . .f.t.	115	233	220	274	296	312	1035	1820	3400	5260
Weight of Mounting complete with Shield . .	c. q. l. 7 1 0	c. q. l. 9 2 0	t. c. q. l. 0 11 3 0	t. c. q. l. 0 14 0 0	t. c. q. l. 0 17 0 0	t. c. q. l. 0 17 2 0	t. c. q. l. 2 14 3 0	t. c. q. l. 3 11 0 0	t. c. q. l. 5 9 0 0	t. c. q. l.
Thickness of Shield . .	·125	·192	·125	·144	None	·157	·236	·236	None	
Weight of Shield . . .	c. q. l. 0 2 17	c. q. l. 1 1 15	c. q. l. 0 3 10	c. q. l. 1 0 15	None	c. q. l. 1 2 8	c. q. l. 3 3 0	c. q. l. 3 0 0	c. q. l. None	
Angle of Elevation . .	25°	23°	16°	16°	50°	43°	50°	40°	55°	
Angle of Depression . .	15°	10°	6°	10°	5°	5°	None	None	3°	

Corrected to March, 1913.

COVENTRY ORDNANCE WORKS' GUNS.

This Table is supplied by the Manufacturers.

—		3-pdr., 50 cal.	6-pdr., 50 cal.	Mountain 3·3-in. 20-pdr., Howitzer.	Field. 12½-pdr., 23 cal.	Field. 15-pdr., 33·44 cal.	Field. 4·65-in. Howitzer.	Field. 6-in. Howitzer.	3-in., 40 cal.	3-in., 50 cal.	4-in., 40 cal.	4-in., 50 cal.	4·7-in., 50 cal.	6-in., 50 cal.	7·5-in., 50 cal.	9·2-in., 50 cal.	11·02-in., 50 cal.	12-in., 50 cal.	13·5-in., 45 cal.	14-in., 45 cal.
Diameter of Bore	in.	1·85	2·244	3·3	3·0	3·0	4·65	6·0	3·0	3·0	4·0	4·0	4·7	6·0	7·5	9·2	11·2	12·0	13·5	14·0
	m.m.	47	57	83·8	76·2	76·2	117·5	152·4	76·2	76·2	101·6	101·6	120·0	152·4	190·5	233·7	280	304·8	342·9	355·6
Length of Gun . .	in.	99·0	119·0	45·25	75·0	100·34	72·0	101·5	123·6	154·5	166·4	208	242·5	310	387·5	475	568	617·7	630	648·7
Weight of Charge .	lb.	1·1	1·75	0·5	1·0	1·626	1·1	5·0	2·0	5·25	5·25	11·25	16·0	31·0	71·0	95	270	285	290	305
Weight of Projectile	lb.	3·3	6·0	20·0	12·5	15·0	37·5	100	12·5	12·5	31	31	45	100	200	380	760	850	1250	1600
Weight of Gun . . .		c. 6	c. 10	c. q. 2 2	c. 6	c. q. 8 2	c. q. 8 2	t. c. q. 1 2 2	c. q. 12 1	c. q. l. 18 2 21	t. c. q. l. 1 5 3 15	t. c. 2 2	t. c. q. 3 14 2	t. c. 8 15	t. c. 15 10	t. 28	t. 42	t. 67	t. c. 76 10	t. 81
Muzzle Velocity .	f.-sec.	2800	2800	860	1600	1850	1000	1120	2300	3000	2300	3000	3000	2950	2950	2950	2950	2950	2600	2450
Muzzle Energy .	f.-tons	179·4	326	102	222	356	260	870	458·5	780	1137	1934	2810	6034	12068	22930	45861	51290	58590	66580
Penetration of Wrought-Iron Plate at Muzzle	in.	..	..	..	..	..	..	..	7·7	11·25	10·8	16·0	17·4	23·1	29·8	37·9	51·2	50·65	49·1	51·7
Penetration of Hard Steel Plate at 5000 yards . .	in.	..	..	..	..	..	..	..	..	..	..	..	2·6	5·5	8·5	12·3	18·0	18·3	18·3	20·7

Corrected to March, 1913.

BEARDMORE GUNS.

This Table is supplied by the Manufacturers.

Gun Calibre.	Length of Bore.	Weight of Gun.	Weight of Shot.	Muzzle Velocity.	Remaining Velocity at a Range of			
					3000 yards.	5000 yards.	6000 yards.	10,000 yards.
inches.	calibres.	tons.	lbs.	ft. secs.	ft. secs.	ft. secs.	ft. secs.	ft. secs.
4·0	50	2·1	31	3000	2045	..	1322	..
6·0	50	8·2	100	3000	2313	..	1725	..
9·2	50	28·5	425	2810	..	2198	..	1670
12·0	50	66·0	950	2820	..	2346	..	1917
13 5	46	77·0	1375	2600	..	2201	..	1838
15·0	42	90·0	1850	2500	..	2140	..	1812

Corrected to March 1913.

SCHNEIDER GUNS.

The information in this Table is given by the Manufacturers.

Calibre, in millimètres	400		370		340		305		240		150		120		100		75		47	37
Calibre, in inches	15·7	15·7	14·5	14·5	13·4	13·4	12·0	12·0	9·4	9·4	5·9	5·9	4·7	4·7	3·9	3·9	2·9	2·9	1·8	1·4
Length, in calibres	40	45	40	45	40	45	45	50	45	50	45	50	45	50	45	50	50	60	60	60
Weight, in tons	99·4	102·5	78·9	83·6	63·7	66·3	52·9	57·3	25·8	27·9	6·3	6·8	3·2	3·5	1·9	2·0	·85	1·2	·30	·17
Weight of A.P. Projectile, lb.	2183	2183	1719	1719	1332	1332	826	826	407	407	99	99	48	48	28·6	28·6	14·3	14·3	3·3	1·76
Weight of Charge, in lb.	540	540	496	496	447	447	353	375	165	176	39·6	40·7	17·8	18·4	13·2	13·8	5·5	6·2	1·3	..
Muzzle Velocity, ft.-secs.	2428	2493	2493	2575	2559	2675	2952	3116	2952	3116	2952	3116	2952	3116	2952	3116	2871	3035	3116	3116
Muzzle Energy, ft.-tons	89444	94287	74268	79272	60706	65388	50007	55717	24667	27487	6001	6686	2932	3268	1734	1931	820	917	223	119
Perforation of Steel at muzzle (ins.)	...	..	..	..	..	..	38·3	41·6	30·1	32·3	18·2	20·1	13·9	15·0	11·6	12·5	9·3	10·0	5·9	5·0
Perforation of Steel at 3000 yards (ins.)	..	..	..	..	..	..	29·3	31·9	21·2	23·1	10·2	11·8	6·4	6·9	4·6	4·9	..	..	..	..
Perforation of Steel at 6000 metres (6561 yards), ins.	17·9	18·7	16 6	17·5	15·2	16·1	..	..	..	..	..	..	..	..	..	..	..	..	..	..

Corrected to March, 1913.

KRUPP SHIP AND COAST GUNS.

From tables supplied by the Company, February 1913.

Calibre . . . . . cm.	7·5 = 2·9 in.			8·8 = 3·4 in.			10·5 = 4·1 in.			12 = 4·7 in.			15 = 5·9 in.			17 = 6·7 in.			19 = 7·4 in.		
Length of Bore . . cals.	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50
Length of Bore . mm.	3000	3375	3750	3520	3960	4400	4200	4725	5250	4800	5400	6000	5965	6710	7455	6905	7765	8630	7600	8550	9500
Total Length . . „	3195	3570	3945	3750	4190	4630	4475	5000	5525	5110	5710	6310	6355	7100	7845	7355	8215	9080	8095	9045	9995
Weight of Gun . . kg.	677	764	850	1094	1234	1373	1555	1755	1950	2325	2620	2910	4460	5020	5590	6930	7800	8680	9230	10400	11550
Weight of Projectile „	5·8	5·8	5·8	9·5	9·5	9·5	16	16	16	24	24	24	46	46	46	70	70	70	95	95	95
Weight of Charge . „	1·65	1·86	2·09	2·66	3·0	3·37	5·05	5·80	6·60	7·5	8·65	9·85	14·4	16·6	18·9	22·4	25·7	29·3	29·8	34·3	39·1
Muzzle Velocity . m.	840	890	940	840	890	940	840	890	940	840	890	940	840	890	940	840	890	940	840	890	940
Muzzle Energy mètre-tons	208·6	234·2	261·2	341·7	383·5	427·8	575	646	721	863	969	1081	1654	1857	2072	2517	2826	3152	3417	3835	4278
Muzzle Penetration (Steel) mm.	203	220	238	243	264	285	292	317	344	338	367	397	426	463	500	492	535	578	553	600	649

Calibre . . . . . cm.	21 = 8·2 in.			24 = 9·4 in.					
Length of Bore . . cals.	40	45	50	40		45		50	
Length of Bore . . mm.	8370	9420	10465	9600		10800		12000	
Total Length . . „	8915	9965	11010	10225		11425		12625	
Weight of Gun . . kg.	12330	13900	15450	18600	16750	21000	19000	23300	21450
Weight of Projectile. „	125	125	125	190	190	190	190	190	190
Weight of Charge . „	39·9	45·8	52·3	60·1	51·8	69·1	60·1	78·8	69·8
Muzzle Velocity . m.	840	890	940	840	800	890	850	940	900
Muzzle Energy mètre-tons	4495	5047	5629	6833	6198	7671	6997	8557	7844
Muzzle Penetration (Steel) mm.	606	658	711	703	658	766	717	828	778

Calibre . . . . . cm.	28 = 11 in.						30·5 = 12 in.					
Length of Bore . . cals.	40		45		50		40		45		50	
Length of Bore . . mm.	11200		12600		14000		12200		13725		15250	
Total Length . . „	11930		13330		14730		12995		14520		16045	
Weight of Gun . . kg.	29550	26600	33300	30200	37000	34050	38200	34400	43000	39000	47800	44000
Weight of Projectile. „	300	300	300	300	300	300	390	390	390	390	390	390
Weight of Charge . „	95	82	110	95	125	111	123	106	142	123	162	143
Muzzle Velocity . m.	840	800	890	850	940	900	840	800	890	850	940	900
Muzzle Energy mètre-tons	10790	9790	12110	11050	13510	12390	14030	12720	15750	14360	17560	16100
Muzzle Penetration (Steel) mm.	828	772	900	842	973	914	912	850	990	927	1071	1006

Calibre	35·56 = 14 in.						38·1 = 15 in.					
Length of Bore	40		45		50		40		45		50	
Length of Bore . . mm.	14225		16000		17780		15240		17145		19050	
Total Length . . „	15150		16925		18705		16230		18135		20040	
Weight of Gun . . kg.	60500	54500	68100	61900	75800	69700	74400	67000	83800	76100	93200	85800
Weight of Projectile „	620	620	620	620	620	620	760	760	760	760	760	760
Weight of Charge . „	196	169	225	196	256	227	241	207	277	241	315	279
Muzzle Velocity . m.	840	800	890	850	940	900	840	800	890	850	940	900
Muzzle Energy mètre-tons	22300	20220	25030	22830	27920	25600	27330	24790	30680	27990	34230	31380
Muzzle Penetration (Steel) mm.	1077	1005	1170	1095	1265	1189	1157	1079	1257	1177	1359	1277

Calibre	40·64 = 16 in.					
Length of Bore	40		45		50	
Length of Bore . . mm.	16255		18290		20320	
Total Length . . „	17315		19345		21375	
Weight of Gun . . kg.	90300	81400	101700	92400	113100	104100
Weight of Projectile „	920	920	920	920	920	920
Weight of Charge . „	292	252	336	292	383	339
Muzzle Velocity . m.	840	800	890	850	940	900
Muzzle Energy mètre-tons	33090	30010	37140	33880	41430	37980
Muzzle Penetration (Steel) mm.	1238	1154	1344	1259	1453	1366

BETHLEHEM STEEL CO.

ORDNANCE.

Table supplied by the Manufacturers, February, 1913.

Calibre.	Length of bore in Calibres.	Calibre.	Weight of Gun.	Weight of Projectile.	At Muzzle.		Penetration of Wrought Iron. (Gavre Formula.)	At 3000 yards Range.			At 8000 yards Range.			Limiting ranges beyond which capped armour piercing projectiles will not penetrate Krupp hard-faced armour of 12 inches and 7 inches thickness.		Calibre.
					Velocity.	Energy.		Dangerous Space for Target 25 feet high.	Energy.	Penetration of Krupp hard-faced armour by capped armour piercing projectiles, with normal impact.	Dangerous Space for Target 25 feet high.	Energy.	Penetration of Krupp hard-faced armour by capped armour piercing projectiles, with normal impact.	12-in. plate.	7-in. plate.	
inches.	calibres.	cms.	lbs.	lbs.	ft. per sec.	foot-tons.	inches.	yards.	foot-tons.	inches.	yards.	foot-tons.	inches.	yards	yards.	inches.
1·457	50	8·7	120	1	2150	32	..	..	..	..	..	..	..	..	..	1·457
1·851	50	4·7	550	3	2400	120	..	..	..	..	..	..	..	..	..	1·851
2·244	50	5·7	960	6	2400	240	..	..	..	..	..	..	..	..	..	2·244
3	50	7·62	1900	13	2800	707	..	..	..	..	..	..	..	..	..	3
4	50	10·16	tons. 2·6	33	2800	1,793	11·0	320	890	..	..	..	..	..	..	4
4	50	10·16	2·6	kilos. 14	3000	1,924	11·5	362	980	..	..	..	..	..	..	4
5	45	12·7	3·4	lbs. 50	2600	2,343	11·3	258	1,996	..	..	..	..	..	..	5
5	50	12·7	4·75	50	3000	3,120	13·8	371	1,514	..	..	..	..	..	..	5
6	45	15·24	7·2	105	2600	4,920	16·9	313	2,970	7·0	60	1,307	4·2	..	2,870	6
6	50	15·24	8·4	105	2800	5,707	18·8	374	3,478	7·7	71	1,543	4·6	..	3,890	6
7	45	17·78	12·7	165	2700	8,338	22·0	358	5,426	9·2	74	2,660	5·9	..	6,063	7
7	50	17·78	14·5	165	2900	9,619	24·4	422	6,263	10·1	87	1,948	4·8	..	7,063	7
8	45	20·32	18·6	260	2800	14,460	29·2	410	9,869	12·3	92	5,457	8·5	3,240	10,420	8
8	50	20·32	22·3	260	2900	15,160	30·7	441	10,616	12·9	100	5,885	8·9	3,950	11,235	8
9·2	50	23·37	30·4	380	2900	22,200	35·8	302	15,760	14·9	107	9,350	10·8	7,237	15,311	9·2
10	45	25·4	35·4	515	2800	27,990	40·5	429	21,080	17·2	106	13,160	12·8	9,075	Max. range	10
10	50	25·4	43·9	515	2900	30,020	42·6	453	22,671	18·0	114	14,394	13·6	10,000	Max. range	10
12	45	30·48	53·8	870	2800	47,380	51·8	439	36,794	21·7	114	24,608	16·9	14,560	Max. range	12
12	50	30·48	66·0	870	2900	50,720	54·4	476	39,990	23·0	123	26,495	17·7	15,596	Max. range	12
14	35	35·56	57·4	1660	2150	53,190	50·4	244	44,660	22·3	70	33,650	18·7	Max. range	Max. range	14
14	45	35·56	70·3	1400	2600	65,700	56·4	362	50,420	24·0	105	39,840	20·7	Max. range	Max. range	14
18	80	45·72	60·0	2075	2150	66,490	49·4	235	52,750	21·1	63	36,365	16·7	15,100	Max. range	18

Guns of 3-inch calibre or under are chambered for fixed ammunition with the powder and projectiles in brass cartridge cases. Guns from 3-inch calibre upwards, and including the 6-inch L-45 gun, can be chambered to use either fixed ammunition, or chambered to use loose ammunition with the powder in cartridge bags and the projectile separate from the powder. Guns above 6-inches calibre and including the 6-inch L-45 gun are chambered for loose ammunition. The breech mechanisms of all guns up to 8 inches are operated by the single motion of a hand-lever. Those of the larger guns are operated by the revolution (3 to 5 turns) of a crank.

The 8-inch, 10-inch, and 12-inch L-50-guns, and the 14-inch L-45 gun are for use in turrets, and are of great weight at the breech in order to balance the long muzzles, so that a comparatively small barbette may be used.

BOFORS GUNS.

Table supplied by the Manufacturers.

Calibre . . . . . . cm.	30·5			28			25·4			24			21		
Calibre . . . . . . in.	12			11·02			10			9·45			8·27		
Length of Gun . . . . cal.	50	45	40	50	45	40	50	45	40	50	45	40	50	45	40
Length of Gun . . . . in.	600·4	540·3	480·3	551·2	496·1	441	500	450	400	472·4	425·2	378	413·4	372	330·7
Weight of Gun . . . . tons	50	44	40	39	35	30	29	26	23	24	22	19	16	14·4	12·8
Weight of Projectile . . . lb.	{981	981	981	761	761	761	564	564	564	474	474	474	309	309	309
	{772	772	772	595	595	595	445	445	445	375	375	375	249	249	249
Weight of Charge . . . lb.	266	239	213	205	184	164	153	138	123	129	116	103	84	75·8	67·5
Muzzle Velocity . . . ft.-secs.	{2776	2625	2477	2776	2625	2477	2789	2638	2490	2789	2638	2490	2828	2677	2526
	{3140	2969	2802	3140	2969	2802	3140	2969	2802	3140	2969	2802	3150	2979	2812
Muzzle Energy . . . ft.-tons	52583	47019	41877	40767	36452	32468	30536	27320	24349	25647	22944	20448	17174	15391	13705
Penetration of soft steel plate at muzzle de Marres formula } in.	39·8	36·8	33·9	36·4	33·6	30·9	32·9	30·3	27·9	30·8	28·5	26·2	26·7	24·7	22·7
Number of rounds per minute .	2	2	2	2	2	2	3	3	3	4	4	4	4	4	4

Calibre . . . . cm.	19·4			15·24			12			10·5			8·7			7·5		
Calibre . . . . in.	7·64			6			4·72			4·13			3·43			2·95		
Length of Gun . . . . cal.	50	45	40	50	45	40	50	45	40	50	45	40	50	45	40	50	45	40
Length of Gun . . . . in.	381·9	343·7	305·5	300	270	240	236·2	212·6	189	227·4	206·7	186	188·4	171·3	154·1	162·4	147·6	132·9
Weight of Gun . . . . tons	12·8	11·6	10·3	5·8	5·3	4·7	2·96	2·56	2·37	2·2	2	1·8	1·88	1·14	1·05	0·72	0·665	0·59
Weight of Projectile . . . lb.	{251	251	251	112·4	112·4	112·4	59·5	59·5	59·5	39·7	39·7	39·7	22·7	22·7	22·7	14·5	14·5	14·5
	{198	198	198	90·4	90·4	90·4	46·3	46·3	46·3	30·9	30·9	30·9	17·6	17·6	17·6	11·5	11·5	11·5
Weight of Charge . . . lb.	68·1	61·3	54·7	33·1	29·8	26·5	16·2	14·5	12·9	10·8	9·7	8·7	6·14	5·53	4·92	3·92	3·53	3·13
Muzzle Velocity . . . ft.-secs.	{2786	2635	2487	2897	2749	2582	2789	2638	2474	2871	2733	2585	2864	2726	2582	2848	2717	2572
	{3140	2969	2802	3235	3051	2884	3143	2973	2805	3251	3097	2933	3248	3084	2936	3215	3074	2907
Muzzle Energy . . . ft.-tons	13566	12136	10815	6565	5913	5215	3220	2881	2567	2267	2057	1841	1292	1169	1049	817	742·7	668·5
Penetration of soft steel plate at muzzle de Marres formula } in.	24·6	22·7	20·9	19	17·6	16·1	14·7	13·6	12·5	13·2	12·3	11·4	10·8	10·1	9·4	9·2	8·5	7·9
Number of rounds per minute .	5	5	5	9	9	9	11	11	11	15	15	15	17	17	17	20	20	20

Corrected to March, 1913.

TABLE RELATING TO CONVERSION OF MEASURES.

Length.

METRIC TO ENGLISH. ENGLISH TO METRIC.

I. Mètres.	II. Yards.	III. Feet.	IV. Inches.	V. Yards.	VI. Mètres.	VII. Feet.	VIII. Mètres.	IX. Inches.	X. Centimètres.
1	1·0936	3·2809	39·37	1	0·91438	1	0·30479	1	2·5400
2	2·1873	6·5618	78·74	2	1·82877	2	0·60959	2	5·0799
3	3·2809	9·8427	118·11	3	2·74315	3	0·91438	3	7·6199
4	4·3745	13·1236	157·48	4	3·65753	4	1·21918	4	10·1598
5	5·4682	16·4045	196·85	5	4·57192	5	1·52397	5	12·6998
6	6·5618	19·6854	236·22	6	5·48630	6	1·82877	6	15·2397
7	7·6554	22·9663	275·60	7	6·40068	7	2·13356	7	17·7797
8	8·7491	26·2472	314·97	8	7·31507	8	2·43836	8	20·3196
9	9·8427	29·5281	354·34	9	8·22945	9	2·74315	9	22·8596

EXPLANATION.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus, find the number

of yards in 2354 mètres (see cols. I. & II.).	of feet in 12·4 mètres (see cols. I. & III.).	of inches in 30·5 centimètres (see cols. I. & IV.). Note, 1 m.=100 cm.	of mètres in 1026 yards (see cols. V. & VI.).	of mètres in 1742 feet (see cols. VII. & VIII.).	of centimètres in 17·72 ins. (see cols. IX. & X.)
mètres. yards.	mètres. feet.	cms. inches.	yards. mètres.	feet. mètres.	inches. cms.
2000=2187·3	10 =32·809	30·0=11·811	1000=914·38	1000=304·79	10·0 =25·400
300= 328·09	2 = 6·562	·5= ·197	20= 18·29	700=213·36	7·0 =17·780
50= 54·68	0·4= 1·312		6= 5·49	40= 12·19	0·7 = 1·778
4= 4·37				2= 0·61	·02= ·051
∴ 2354=2574·44	∴ 12·4=40·683	∴ 30·5=12·008	∴ 1026=938·16	∴ 1742=530·95	∴ 17·72=45·009

NOTE.—A ready way of approximately converting all French measures into English inches is to multiply by 4 and apply the decimal point by common sense—Thus for a 15-cm. gun; 15 × 4 = 60. Now this Calibre cannot be 60 inches, nor can it be 0·6 inch; therefore it must be 6 inches. (The exact value is 5·906 in.)

Weight.

METRIC TO ENGLISH. ENGLISH TO METRIC.

I. Kilogrammes.	II. Tons.	III. Pounds Avoirdupois.	IV. Grains Troy.	V. Tons.	VI. Milliers.	VII. Pounds Avoirdupois.	VIII. Kilogrammes.	IX. Grains. Troy.	X. Gramme
1	·000984	2·2046	15432·3	1	1·016	1	0·4536	1	·0648
2	·001968	4·4092	30864·7	2	2·032	2	0·9072	2	·1296
3	·002953	6·6139	46297·0	3	3·048	3	1·3608	3	·1944
4	·003937	8·8185	61729·4	4	4·064	4	1·8144	4	·2592
5	·004921	11·0231	77161·7	5	5·080	5	2·2680	5	·3240
6	·005905	13·2277	92594·1	6	6·096	6	2·7216	6	·3888
7	·006889	15·4323	108026·4	7	7·112	7	3·1751	7	·4536
8	·007874	17·6370	123458·8	8	8·128	8	3·6287	8	·5184
9	·008858	19·8416	138891·1	9	9·144	9	4·0823	9	·5832

EXPLANATION.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus, find the number

of tons in 35 milliers (see cols. I. & II. Note, 1000 kg. =1 millier).	of pounds in 56·3 kilogrammes. (see cols. I. & III.).	of grains in 120 grammes (see cols. I. & IV. Note, 1000 grms. = 1 kg.)	of milliers in 38 tons (see cols. V. & VI.).	of kilogrammes in 68 pounds (see cols. VII. & VIII).	of grammes in 85 grains (see cols. IX. & X.).
milliers. tons.	kgrms. lbs.	grammes. grains.	tons. milliers.	lbs. kgs.	grains. grammes.
30 = 29·53	50 =110·231	100=1543·23	30 = 30·48	60 = 27·216	80 = 5·184
5 = 4·92	6 = 13·228	20= 308·65	8 = 8·13	8 = 3·629	5 = 0·324
	0·3= ·661				
∴ 35 = 34·45	∴ 56·3=124·120	∴ 120=1851·88	∴ 38 = 38·61	∴ 68 = 30·845	∴ 85 = 5·508

NOTE.—7000 grains troy = 1 pound avoirdupois.

PRESSURE.

Metric to English.			English to Metric.				Atmospheric to English.		English to Atmospheric.	
I. Kilogrammes per square centimètre.	II. Pounds per square inch.	III. Tons per square inch.	IV. Pounds per square inch.	V. Kilogrammes per square centimètre.	VI. Tons per square inch.	VII. Kilogrammes per square centimètre.	VIII. Atmospheres.	IX. Tons per square inch.	X. Tons per square inch.	XI. Atmospheres.
1	14·223	·00635	1	·07031	1	157·49	1	·00656	1	152·38
2	28·446	·01279	2	·14062	2	314·99	2	·01313	2	304·76
3	42·668	·01905	3	·21003	3	472·48	3	·01969	3	457·14
4	56·891	·02540	4	·28124	4	629·97	4	·02625	4	609·52
5	71·114	·03175	5	·35155	5	787·47	5	·03281	5	761·91
6	85·337	·03810	6	·42186	6	944·96	6	·03938	6	914·29
7	99·560	·04445	7	·49217	7	1102·45	7	·04594	7	1066·67
8	113·783	·05080	8	·56248	8	1259·95	8	·05250	8	1219·05
9	128·005	·05715	9	·63279	9	1417·44	9	·05906	9	1371·43

Note.—One atmosphere is taken to be 14·7 lbs. per square inch.

Explanation.—To convert any number from one measure to the other, take the value of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus, find the number

of pounds per square inch in 32·1 kilogrammes per square centimètre (see cols. I. & II.).

kgs. per sq. cm.		lbs. per sq. in.
30	=	426·68
2	=	28·45
0·1	=	1·42
∴ 32·1	=	456 55

of tons per square inch in 3210 kilogrammes per square centimètre (see cols. I. & III.).

kgs. per sq. cm.		tons per sq. in.
3000	=	19 05
200	=	1·27
10	=	·06
∴ 3210	=	20·38

of kilogrammes per square centimètre in 15 lbs. per square inch (see cols. IV. & V.).

lbs. per sq. in.		kgs. per sq. cm.
10	=	·7031
5	=	·3516
∴ 15	=	1·0547

of kilogrammes per square centimètre in 18 3 tons per square inch (see cols. VI. & VII.).

tons per sq. in.		kgs. per sq. cm.
10	=	1574·9
8	=	1259·95
0·3	=	47·25
∴ 18·3	=	2882·10

of tons per square inch in 3254 atmospheres (see cols. VIII. & IX.).

atmospheres.		tons per sq. inch.
3000	=	19·69
200	=	1·31
50	=	·33
4	=	·03
∴ 3254	=	21·36

of atmosphere in 14·6 tons per square inch (see cols. X. & XI.).

tons per sq. in.		atmospheres.
10	=	1523·8
4	=	609·5
0·6	=	91·4
∴ 14·6	=	2224·7

ENERGY.

Metric to English.		English to Metric.	
I. Mètre-tons.	II. Foot-tons.	III. Foot-tons.	IV. Mètre-tons.
1	3·2291	1	0·3097
2	6·4581	2	0·6194
3	9·6872	3	0·9291
4	12·9162	4	1·2388
5	16·1453	5	1·5484
6	19·3743	6	1·8581
7	22·6034	7	2·1678
8	25·8324	8	2·4775
9	29·0615	9	2·7872

1 mètre-ton is termed a "dinamode" in Italy.

Explanation.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus find the number

of foot-tons in 4367 mètre-tons (see cols. I. & II.).

mètre-tons.		foot-tons.
4000	=	12916·2
300	=	968·72
60	=	193·74
7	=	22·60
∴ 4367	=	14101·26

of mètre-tons in 3592 foot-tons (see cols. III. & IV.).

foot-tons.		mètre-tons.
3000	=	929·1
500	=	154·84
90	=	27·87
2	=	·62
∴ 3592	=	1112·43

PERFORATION THROUGH IRON AND STEEL WITH THE FACE NOT HARDENED.

To obtain perforation through steel equivalent to a given perforation through iron, and *vice versa*.

1 inch steel = $1\frac{1}{4}$ inches iron;

that is, 4 inches steel = 5 inches iron.

Thus, given 9·4 inches perforation through iron,

$$9·4 \times \frac{4}{5} = 7·52 \text{ inches steel;}$$

or, given 5·2 inches steel,

$$5·2 \times \frac{5}{4} = 6·5 \text{ inches iron.}$$

PART IV.

STATISTICS, OFFICIAL STATEMENTS AND PAPERS.

STATEMENT showing the NET EXPENDITURE from NAVY VOTES and LOANS on account of NAVAL SERVICES for the Years 1901–2 to 1911–12, together with the ESTIMATES for 1912–13 and 1913–14.

Year	Total Expenditure from Navy Votes (Net). (1)	Annuity in Repayment of Loans under the Naval Works Acts. (2)	Total Expenditure exclusive of Annuity [Column (2) deducted from Column (1).] (3)	Expenditure from Loans under Naval Works Acts. (4)	Total of Columns (3) and (4). (5)	Expenditure on New Construction (Vote 8). (6)
	£	£	£	£	£	£
1901–2	30,981,315	122,255	30,859,060	2,745,176	33,604,236	8,865,080
1902–3	31,003,977	297,895	30,706,082	3,198,017	33,904,099	8,534,917
1903–4	35,709,477	502,010	35,207,467	3,261,083	38,468,550	11,115,733
1904–5	36,859,681	634,238	36,225,443	3,402,575	39,628,018	11,263,019
1905–6	33,151,841	1,015,812	32,136,029	3,313,604	35,449,633	9,688,044
1906–7	31,472,087	1,094,309	30,377,778	2,431,201	32,808,979	8,861,897
1907–8	31,251,156	1,214,403	30,036,753	1,083,663	31,120,416	7,832,589
1908–9	32,181,309	1,264,033	30,917,276	948,262	31,865,538	7,406,930
1909–10	35,734,015	1,325,809	34,408,206	—	34,408,206	9,597,551
1910–11	40,419,336	1,322,752	39,096,584	—	39,096,584	13,077,689
1911–12	42,414,257	1,322,752	41,091,505	—	41,091,505	12,526,171
1912–13 (estimated)	45,075,400	1,322,752	43,752,648	—	43,752,648	14,595,527
1913–14 (estimated)	46,309,300	1,311,558	44,997,742	—	44,997,742	13,276,400

First Lord's Statement explanatory of Navy Estimates, 1913-14.

THE Estimates for 1913–14 amount to £46,309,300, as compared with £45,075,400 for the current year (including the Supplementary Estimate).

The principal increases occur under the heads of Pay of *Personnel* (Vote I.), Victualling and Clothing (Vote II.), and Naval Armaments (Vote IX.).

The increase in the Vote for *Personnel* is due mainly to the requirements of new ships now being placed in commission and under construction.

It is proposed to reach a total of 146,000 officers and men by March 31, 1914. This requires an addition to Vote A of 8500 and an increase in average bearing throughout the year of 5000. The maximum figure is given for Vote A instead of, as heretofore, the average figure, which was somewhat misleading.

The increase of £712,200 in Vote I. is due chiefly to the pay required for the additional *personnel*, and to meet the charge for increases of pay to officers and men recently approved.

The increase under Vote II. is to provide for Victuals and Clothing for additional numbers of the Fleet and for the maintenance of Reserves and Stores.

The increase in the armaments vote is mainly due to the requirements of new construction.

The increases under Votes XII., and the non-effective Votes are mainly automatic, the addition to the non-effective charge being £91,900.

The extraordinary pressure of work in the shipyards and the scarcity of labour are leading to short earnings by contractors on the continuation programmes; and I do not estimate that more than £11,224,000 will be spent on this branch of new construction (Vote VIII.) within the year as compared with £12,067,727 estimated for 1912–13. Every effort will be made to secure punctual deliveries, and should conditions change and progress improve, a further Estimate will be presented later in the year.

A sum of £2,052,400 is required for beginning work on ships of the new programme, which is composed as follows:—

5 battleships,
8 light cruisers,
16 destroyers,
together with a number of submarines and subsidiary craft.

The total cost of the new programme is £15,958,525, as compared with £13,014,000 in 1912–13.

I attach the usual statement of work done by the Department during the past year, together with a reprint of certain Admiralty memoranda, which were published in September last.

WINSTON S.-CHURCHILL.

ADMIRALTY,
8th March, 1913.

STATEMENT OF WORK.

SHIPBUILDING.

Between April 1, 1912, and March 31, 1913, the following ships will have been completed and become available for service:—

Battleships: King George V., Centurion, Thunderer, Conqueror.
Battle-cruisers: Lion, Princess Royal, New Zealand.
Light cruisers: Chatham, Dublin, Southampton, Amphion, Melbourne (for the Commonwealth of Australia).
Destroyers: Attack, Badger, Lizard, Hydra, Goshawk, Phœnix, Firedrake, Lurcher, Oak, Beaver, Acasta, Christopher, Shark, Achates, Cockatrice.
5 Submarines: D 6, E 1, E 4.
Miscellaneous: Maidstone, Adamant, Alecto.

On April 1, 1913, there will be under construction:—

11 Battleships (including Malaya).
3 Battle-cruisers (including one for the Commonwealth of Australia).
13 Light cruisers (including one for the Commonwealth of Australia).
35 Torpedo-boat Destroyers.
21 Submarines (including two for the Commonwealth of Australia).
A number of vessels for carrying oil fuel, and for various Fleet services.

New Construction.

The Conqueror and Thunderer have been completed and commissioned.

The King George V. has been completed and commissioned, and the Centurion, which has been delayed owing to a collision during the early stages of her steam trials, will be completed in April.

The Ajax and Audacious have both been launched.

The Iron Duke and Marlborough, of the 1911–12 programme, have been launched, and progress made with the Delhi and Benbow, the two other battleships of this programme.

The four battleships of the 1912–13 programme, Queen Elizabeth, Warspite, Barham and Valiant, have been laid down, the two former at Portsmouth and Devonport, and the two latter at the yards of

Messrs. John Brown and Company and the Fairfield Company, at Glasgow, respectively.

Of the battle-cruisers, the Princess Royal and the New Zealand (built for the New Zealand Government) have been completed and commissioned, and the Queen Mary will shortly proceed on trial, and prepare for completion and commission.

Progress has been made with the battle-cruiser Tiger, of the 1911–12 programme, at the works of Messrs. John Brown and Company.

Of the five vessels of the Chatham class under construction, the Chatham, Dublin, and Southampton have been completed and commissioned; H.M.A.S. Melbourne has been completed and commissioned for the service of the Australian Commonwealth. The remaining vessel, H.M.A.S. Sydney, is expected to have completed her steam trials and be commissioned early in the new financial year. A cruiser of this type, H.M.A.S. Brisbane, is being built in Australia by the Commonwealth Government. Detailed drawings have been supplied by the Admiralty for the use of the Commonwealth authorities, and tenders for machinery are being invited in this country.

The three light cruisers, 1911–12, are under construction, the Birmingham at the works of Messrs. Armstrong, Whitworth and Company, Limited; the Lowestoft at H.M. Dockyard, Chatham; the Nottingham at H.M. Dockyard, Pembroke. Substantial progress has been made on all these ships; the Lowestoft will be launched on April 23 next.

The orders for the eight light cruisers of the 1912–13 programme have been placed as follows:—one at H.M. Dockyard, Chatham; one at H.M. Dockyard, Devonport; three with Messrs. Beardmore and Company; two with Vickers, Limited; one with the Fairfield Shipbuilding Company. All these ships are to be completed in the summer of 1914.

The light cruiser Amphion is being completed at H.M. Dockyard, Pembroke, and will probably be commissioned by the end of the present financial year. The light cruiser Fearless, also under construction at Pembroke, was launched in June last, and should be completed early in the new financial year.

All the destroyers of the 1910–11 programme have been delivered and are in commission. Two of the destroyers of the 1911–12 programme have been delivered, and three more are expected to be delivered before the close of the present financial year.

The twenty vessels of the programme for 1912–13 have been ordered, and good progress has been made in their construction.

Good progress has been made with the construction of submarines. The depôt ship for submarines, the Maidstone, and her tenders, the Adamant and Alecto, have been completed.

The surveying ship Endeavour has been completed and delivered.

It has been decided not to proceed with the two shallow-draught steamers, Kingfisher and Rail, for service in China, until the new financial year.

The Woolwich, depôt ship for torpedo-boat destroyers, is nearing completion.

The two floating docks for Portsmouth and the Medway have been completed and delivered; a small floating dock for destroyers has been completed and placed at Harwich; and one for submarines, to be stationed ultimately at Dover, has been completed and is at present at Sheerness.

A small floating dock for destroyers has been ordered for Portland for completion next year.

The S.S. Knight Companion, Tabaristan, and Heliopolis (to be renamed Mediator) have been provisionally purchased, subject to satisfactory trials and survey, and will be converted into a fleet repair ship, a depôt ship for torpedo-boat destroyers, and a hospital ship respectively.

Administration.

The development of the War Staff, under the direction of Rear-Admiral E. C. T. Troubridge, C.B., C.M.G., M.V.O., since succeeded by Vice-Admiral Sir Henry Jackson, K.C.B., K.C.V.O., F.R.S., has been continuous throughout the year. The Board of Admiralty are satisfied with the progress made both in regard to the organisation at the Admiralty and the training of officers at the War College.

Sir Philip Watts, K.C.B., has retired under the age rule from the post of Director of Naval Construction, but has been retained for a time in the position of Adviser on Naval Construction to the Board. Mr. E. H. Tennyson D'Eyncourt has been appointed Director of Naval Construction.

Colonel Sir Edward Raban, K.C.B., R.E., has retired from the post of Director of Works, and has been succeeded by Mr. T. Sims, C.B., M.I.C.E.

Sir W. E. Smith, C.B., has retired from the position of Superintendent of Construction Accounts and Contract Work, and has been succeeded by Mr. W. H. Whiting.

Rear-Admiral Frederick C. T. Tudor has been appointed Director of Naval Ordnance in succession to Rear-Admiral Archibald G. H. W.

Moore, C.V.O., C.B., who has been appointed Third Sea Lord of the Admiralty.

Rear-Admiral Arthur W. Waymouth has been appointed to the new office of Director of Naval Equipment, with the duty of dealing with naval professional questions relating to the equipment and fittings of ships.

Captain Murray F. Sueter, R.N., has been appointed Director of the Air Department, which has been established to deal with matters relating to the Naval Air Service. This service has been placed under the superintendence of the Second Sea Lord.

In consequence of the changes in the organisation of the Controller's Department which have already been announced, the Third Sea Lord has been relieved of the departmental functions which he has hitherto discharged in the capacity of Controller, and the Heads of Branches in the former Controller's Department have been given the status of Heads of Departments.

Effect has been given to the recommendations of the Committees on the Royal Corps of Naval Constructors and on the Writing Staff of the Home Dockyards.

The Reports of the Committees on the Admiralty Works Department, and on the Education and Training of Cadets, Midshipmen, and Junior Officers of H.M. Fleet, are at present engaging the attention of the Board.

The Financial Regulations with regard to official business have been revised, and the Finance Committee has been reorganised in accordance with the Memorandum published in September last.

The Royal Commission on Liquid Fuel is still pursuing its labours.

Naval Policy in the Overseas Dominions.

The principal vessels now building for the Australian Fleet unit are nearing completion. H.M.A.S. Melbourne is in commission and is on her way to Australia, and H.M.A. ships Australia and Sydney will be commissioned early this summer. Arrangements have been made for the naval establishments at Sydney to be transferred to the Commonwealth on July 1, 1913. Rear-Admiral George E. Patey, M.V.O., has been appointed in command of the Australian Fleet under the Commonwealth Government, and will sail from England in H.M.A.S. Australia, which will be his flagship.

Temporary arrangements have been made for the period of transition prior to the arrival of the fleet unit in Australia. Certain ships of the existing Australian Squadron have been withdrawn in

advance, and H.M.S. Encounter has been lent to the Commonwealth, with a nucleus crew, as a training ship for the recruits who are being raised in Australia for the Fleet unit, proportionate deductions being made from the Australian naval subsidy. Legislation has been passed by the Commonwealth covering this and any similar arrangement which may be necessary.

To assist in the development of the Royal Australian Navy, a number of active service petty officers and men have been lent as part of the complement of H.M.A. ships Australia, Melbourne, Encounter, and Tingira, and for the Royal Naval College, Geelong. A considerable number of naval pensioners and Royal Fleet Reserve men have also been enrolled for temporary service in the Royal Australian Navy.

H.M.S. Pioneer has been presented to the Commonwealth as a free gift for use as a gunnery training ship.

In response to a suggestion from the Admiralty, the Government of New Zealand have agreed to the battle-cruiser New Zealand (presented by the Dominion to the Royal Navy) being stationed wherever His Majesty's Government consider her services of most value. The Admiralty, availing themselves of the generous permission granted, propose to employ her in the First Battle-cruiser Squadron on her return from New Zealand, whither she is now proceeding on a special visit.

The principal development of Imperial naval policy during the year has been in Canada. Mr. Borden and other members of the Canadian Cabinet visited London to confer with the Admiralty. On their invitation the Admiralty prepared a statement of the present and immediate prospective requirements of the naval defence of the Empire for the consideration of the Canadian Government. Mr. Borden has since announced in the Canadian House of Commons the decision of his Government to propose the grant to the Crown of £7,000,000 for the immediate construction of three of the most modern type of armoured ships. It is intended to place these ships at the disposal of the Imperial Government for the common defence of the Empire, to be controlled and maintained as part of the Royal Navy. Mr. Borden added: "If at any time in the future it be the will of the Canadian people to establish a Canadian unit of the British Navy, these vessels can be called by the Canadian Government to form part of the Navy, in which case, of course, they will be maintained by Canada and not by Great Britain." This measure is still under discussion in the Canadian Parliament.

By the South Africa Defence Act of 1912 provision was made by the Government of the Union of South Africa for the establishment,

at the expense of the Union, of a South African Division of the Royal Naval Volunteer Reserve, which will be available for general service in the Royal Navy in the event of emergency. The Act provides that the government, organisation, administration, training, and conditions of service of the division shall be governed by regulations made under the authority of the Admiralty and accepted by the Governor-General. Draft regulations have been prepared by the Commander-in-Chief in concert with the Union authorities, and are now under consideration. It is expected that the division will be constituted on July 1 next.

The Federated Malay States have offered a first-class armoured ship to the Imperial Government, and the offer has been gratefully accepted. The contract for this ship, which has been named Malaya, and will be of the same design as the Queen Elizabeth, has been placed with Messrs. Armstrong, Whitworth and Company, Limited.

Organisation of the Fleet.

The Home, Atlantic, and Mediterranean Fleets have been re-organised. The battleships in full commission (at present twenty-nine in number, to be raised later to thirty-three) have been organised in four battle squadrons of the First Fleet, with a Fleet flagship. Corresponding to these are the First Battle-Cruiser Squadron and the Second, Third, and Fourth (Armoured) Cruiser Squadrons; the last, having only recently been constituted out of the Training Squadron, is for the time being manned on a Second Fleet basis. In addition to the First Fleet the Home Fleets comprise a Second Fleet, with a Fifth and Sixth Squadron (the latter still in process of formation), and a Third Fleet, with a Seventh and Eighth Battle Squadron and six more cruiser squadrons. The Second Fleet is manned with active (full nucleus) crews, and the Third Fleet with Reserve (reduced nucleus) crews. For the present, however, the Sixth Cruiser Squadron will be manned on a Third Fleet basis.

The Mediterranean Fleet will in future comprise a battle-cruiser squadron (styled the Second) of four ships of the Indomitable class, and an armoured cruiser squadron (the First), also composed of four powerful ships.

To the First Fleet are attached four fully-manned destroyer flotillas, and a fifth will be formed as new destroyers are delivered. Four other destroyer flotillas, manned with active crews, have been organised as a separate command under an "Admiral of Patrols," and are known as "Patrol Flotillas." In the same organisation are comprised the bulk of submarine flotillas. The growing importance

of this arm has been recognised by the advancement of the Officer in Charge of the Submarine Service to Commodore.

The preliminary sea training of boys for the Fleet will in future be carried out in cruisers of the Edgar class based on Queenstown, in charge of a Captain. These vessels have special complements in peace, but will belong to cruiser squadrons of the Third Fleet on mobilisation.

The organisation of the remaining squadrons and detached ships has not been varied in any important respect.

Fleet Exercises.

The final section of the combined exercises off the coast of Spain, referred to in my previous statement, continued until the last week of March, when the Mediterranean Fleet, the Training Squadron, and the vessels of the Second Fleet engaged therein were dispersed.

The main manœuvres were held in July in Home waters. All the squadrons and flotillas of the First and Second Fleets, including mine-layers and mine-sweepers, all the patrol flotillas, and the Training Squadron, together with certain Third Fleet ships and Mediterranean cruisers, took part in the manœuvres.

On the termination of the manœuvres tactical exercises were carried out for three days. In October tactical exercises were again carried out by the First Fleet.

In the autumn the patrol flotillas were exercised off the east coast of Great Britain, and the destroyer flotillas of the First Fleet off the north coast.

General Service of the Fleet.

The movements of the Mediterranean Fleet have been affected by the disturbed political conditions of the Eastern Mediterranean during the past year. For a portion of the time several vessels were stationed in Cretan waters; owing to disturbances in Samos a ship was also sent to that island. The advance of the allied Balkan armies on Salonica and Constantinople led to the dispatch of ships of various Powers, and for a time an international naval force was landed at the latter place. Various ports on the Anatolian and Syrian coasts have been visited by men-of-war, in case disturbances should arise which might endanger European lives and property. In no case, however, during the year has the actual employment of armed force been required.

Since November last, during a period of great tension in the Near East, the Third Battle Squadron has been in the Mediterranean, in

accordance with a long-standing arrangement. For a time this squadron was in the Ægean.

In the East Indies the operations for the suppression of the arms traffic have continued throughout the year. A considerable number of captures have been made, and the deterrent effect of the blockade has undoubtedly been great.

In China, the situation having become more composed since last year, the special dispositions which were adopted during the progress of the Revolution have been terminated and all landing parties withdrawn.

Ceremonies and Visits.

His Majesty the King visited the First and Second Fleets at Weymouth in May, and during several days witnessed various exercises of the Fleets.

The Houses of Parliament were present in July, on board a vessel chartered for the occasion, at an inspection by the Board of Admiralty of the assembled Fleet at Portsmouth prior to the manœuvres. After visiting some of the newer types of ships at anchor, they saw the Fleet weigh and disperse from Spithead to its manœuvre stations.

The Mediterranean Cruiser Squadron was present off Nice and Cannes on the occasion of the unveiling of memorials to Queen Victoria and King Edward in April. At the review at Nice a British naval brigade of seamen and marines with guns marched past with the French troops. The utmost cordiality was displayed by the French authorities, and courtesies and entertainments were exchanged with the French Fleet.

In August H.M.S. Gloucester was present at Antwerp during the visit to that city of Their Majesties the King and Queen of the Belgians. Officers and men took part in various festivities, and the ship was honoured by a visit from the King of the Belgians.

In the autumn the First Cruiser Squadron visited Norway and Denmark, and the Second Cruiser Squadron Sweden and Russia. The squadrons were everywhere most hospitably received.

In the course of a summer cruise the Commander-in-Chief (China), in his flagship, accompanied by another armoured cruiser, paid short visits to Tsingtau and Vladivostok in July and September respectively. Early in this year he paid a short visit to Saigon. At all three ports he received a warm welcome from the authorities.

H.M.S. Natal conveyed the remains of the late American Ambassador, Mr. Whitelaw Reid, from Portsmouth to New York, and her officers represented the Royal Navy at the funeral.

H.M.S. New Zealand, the gift of the Dominion Government to

the Royal Navy, is now proceeding *viâ* the Cape to New Zealand, where every opportunity will be given, during a stay of about three months, for as many as possible of the citizens to inspect their ship. She will subsequently return *viâ* British Columbia, South America, and the West Indies to England, and will then join the First Battle-Cruiser Squadron.

Before her departure from Portsmouth, the ship was inspected by the King on February 5th. His Majesty was attended by the Board of Admiralty, the Secretary of State for the Colonies, the Minister of Defence for New Zealand, the High Commissioner for New Zealand, and the late Prime Minister of the Dominion. A reception of representative citizens of New Zealand resident in the Mother Country was also held on board before the ship sailed.

Naval Bases and Works.

Progress on the important naval works under construction at Rosyth has been interfered with by strikes and labour difficulties, but every effort is being made by the contractors to recover the lost ground. The construction of a third dock has been ordered. Permanent moorings have been laid for destroyers using the anchorage to the west of the Forth Bridge.

In the Humber an oil fuel depôt is under construction for the Admiralty, with a view to the river being used as a base for torpedo craft. Contracts have also been let for the erection of oil fuel storage in the Medway, at Invergordon, and at Portsmouth.

The inner harbour and depôt for destroyers and submarines at Dover is making good progress. The main Admiralty Harbour has been principally used by torpedo craft during the past year.

It is intended to station four battleships and three cruisers of the Third Fleet at Pembroke. These vessels will be maintained there on the ordinary Third Fleet basis.

As already stated, Queenstown will in future be used as a base for boys' training cruisers, eight vessels being detailed for this service.

By the stationing of these fifteen vessels at Pembroke and Queenstown, it is anticipated that the difficulty which has been felt for some time past in finding berthing room at the three principal naval ports will be reduced.

Repairs of the Fleet.

After investigation by a special committee, orders have been issued to the Fleet and dockyards which will have the effect of reducing the length of time spent by ships undergoing annual refit, and, in consequence, of strengthening the squadrons at sea. By the

more systematic examination of defects as they arise, the excessive accumulation of defects for the dockyards to deal with will, it is hoped, be avoided; and by various steps, including the limitation of alterations to such as are strictly essential, the standard time for an annual refit will be reduced to four weeks.

PERSONNEL.

The Committee appointed to inquire into the education and training of cadets and midshipmen, presided over by Admiral Sir Reginald Custance, has presented its report, which is now under the consideration of the Board. It has been found possible, however, to make certain changes recommended without waiting for a decision on the more important questions involved. The examinations in seamanship and in navigation and pilotage are now passed at sea after two years and four months' service as midshipmen, instead of on shore after three years as hitherto, and, on passing, midshipmen are rated Acting Sub-Lieutenant. The remaining examinations, in gunnery, torpedo, and engineering, are held eight months afterwards, but the examination in voluntary subjects has been abolished. By this means the strain of the examinations will be considerably lessened, and better results will undoubtedly be obtained. The annual examination of midshipmen afloat has been abolished.

In order to meet the growing requirements of the Fleet, it has been decided to enter a limited number of Lieutenants and Sub-Lieutenants on a Supplementary List of the Royal Navy. Candidates for appointment will be selected from officers of the Royal Naval Reserve who have undergone, or are undergoing, twelve months' training in the Royal Navy. In exceptional cases these officers will be eligible for promotion to the rank of Commander.

It is further proposed to meet the increased demand for officers by means of the special entry of a limited number of cadets of about the age of eighteen who have completed their general education in the public schools or elsewhere. A number of such cadets, not exceeding thirty, will be admitted by competitive examination of selected candidates during this and each of the succeeding three years. They will be sent to a naval establishment for a course of professional training before being distributed as midshipmen in the Fleet. Their service as midshipmen will be somewhat shortened in comparison with that of other midshipmen, in view of their greater maturity. The same subsequent career will be open to them as to officers who have entered through Osborne. They will be employed as general service officers, and it will be open to them to volunteer for service in any one of the special branches.

It is necessary to emphasise the fact that the scheme of special admissions is in the nature of an emergency measure, designed to prevent an anticipated shortage, and that the intention of the Board is to retain the Osborne-Dartmouth training for the main body of Naval officers.

With a view to encourage the study of Foreign Languages and Naval History, it is intended to institute a system of prizes, medals, and certificates in these subjects, to be competed for by Junior Lieutenants.

The development of the War Staff has proceeded on the lines laid down in the Memorandum published last year; 39 Naval and 7 Marine Officers have been appointed to form the nucleus of the War Staff. The first War Staff Course, to which 12 Naval and 3 Marine Officers were appointed, commenced in April last and has just terminated. A second class, consisting of 12 Naval and 3 Marine Officers, began the course at the end of last month.

A series of lectures on International Law and Prize Manual, Merchant Shipping and Court-martial procedure, supplemented by instruction in the principles of Strategy and Tactics, has been started at the Branch War College at Devonport, and the reports on the first two courses are satisfactory. Owing to the expansion of the work at the Branch War College at Chatham, a Captain has been appointed to take charge of it.

The relative rank of officers of the Royal Marines when embarked has been revised. Lieutenants, Royal Marines, of two years' seniority, when afloat, now rank with Lieutenants, Royal Navy, and Majors, Royal Marines, rank with Commanders, Royal Navy. The limits in the age for the direct entry of Royal Marine Officers have been altered from 17 to 18 to 17 to 18½, and higher mathematics has been made an optional instead of a compulsory subject.

As already announced, a new scale of pay for Lieutenants has been introduced, and the rates of half-pay for Captains and the sea-going command money of Commanders have been increased.

The further officers required have been lent to the Australian Government for service in ships of the Royal Australian Navy and for duty on shore.

The Naval Medical School at the Royal Naval College has been established. Two courses for newly entered surgeons were held at the school last year, and the first post-graduate course commenced in September. A further post-graduate course began last month. Satisfactory arrangements have been made with the Dreadnought Seamen's Hospital Society and the London School of Tropical

Medicine for the educational and scientific work of the medical officers of the Naval Medical School.

A new scheme was introduced last autumn to enable warrant officers, petty officers, and seamen to reach the rank of commissioned officer at an early age. The candidates selected undergo courses of instruction at Portsmouth, and on passing are given the rank of Acting Mate. They then proceed to the Royal Naval College at Greenwich for four months' instruction in navigation, followed by two months' instruction in pilotage at the Navigation School at Portsmouth. On passing the examination at the termination of this course, they are confirmed as Mates and are embarked in sea-going ships for two years, at the end of which time they are eligible for promotion to the rank of lieutenant. Their duties as lieutenants will be the same as those of other lieutenants, and they will be considered for promotion to commander with other lieutenants on their merits. Twenty candidates were selected for the first course in October last, and a further selection is now being made.

As announced last year, all deserving warrant officers of the Royal Navy are now promoted to commissioned warrant rank after fifteen years' service, the change being introduced from April 1st last.

During the financial year 1911–12, 11,576 naval ratings and 1556 marines were recruited from the shore through the various recruiting agencies. This was the largest total entry since 1901–2, exceeding the numbers recruited in 1910–11 by 270. Recruiting generally was satisfactory in this period except for armourers, carpenter's crew, and painters.

Additional temporary accommodation has been provided for the harbour training of boys by the transfer of youths formerly trained in H.M.S. Ganges II., at Harwich, to Devonport Barracks, and by the addition of H.M.S. Powerful to the Impregnable Establishment at Devonport. Under these arrangements about 1050 additional boys can be accommodated for harbour training.

The Inspecting Captain of Boys' Training Ships has now been relieved of the command of H.M.S. Impregnable, and has been appointed for the duty of inspecting and supervising generally the training of boys.

A general increase in the pay of the men of the Royal Navy and Royal Marines was made on December 1st last. The details have already been given in the paper presented to Parliament, the estimated cost of the increase to officers and men being £386,473 per annum.

Included in this provision was the extension of the grant of a

free kit to certain classes of ratings who previously had only received a gratuity towards the expense of their Service clothing.

With a view to the prevention and early detection of cases of tuberculosis in H.M. Navy, directions have been issued to the Fleet for certain hygienic precautions to be observed on board ship. A Committee has also been appointed to consider the best methods of ventilating modern ships of war.

A scheme has been instituted for enlisting the assistance of private residents at ports visited by H.M. ships to give night accommodation to men on week-end leave. The scheme has already been partially tried and has proved of great help to the men.

As already announced, the system of summary punishments in the Navy has been closely investigated during the past year by a Committee appointed under the presidency of Rear-Admiral F. E. E. Brock, C.B. Experience has shown that many of the punishments were out of date and ill-adapted to the needs of the modern Navy.

Full effect has been given to the recommendations of the Committee by the abolition of some punishments and the drastic revision of others, and it is confidently expected that the changes made will prove beneficial to the men, while at the same time maintaining the high standard of discipline that has always been associated with the Royal Navy.

Steps have also been taken to ensure that Chief Petty Officers and Petty Officers of the Royal Navy, and non-commissioned officers of the Royal Marines, shall be given the option of trial by court-martial before being disrated summarily.

Royal Marines.

The numbers borne on March 31, 1913, will be about 16,300. There will be also about 1400 band ranks afloat and under training. Of these numbers, 4483 have re-engaged to complete time for pension, as compared with 4318 last year.

The training of non-commissioned officers and men in the higher gunnery ratings continues to give satisfactory results. The instructional turret at Eastney is now practically complete, and will afford facilities for preliminary training of gunlayers before proceeding to H.M.S. Excellent.

After the close of the Naval Manœuvres, a battalion of Royal Marines attended the Army Brigade training on Salisbury Plain.

Thirteen officers have been admitted to the corps during the past

year by direct entry, and are now probationary second lieutenants at the Royal Naval College, Greenwich. Further entries will be made by competitive examination in June next to fill existing vacancies.

Approval has been given for two commissions to be granted each year to candidates selected from Warrant Officers, Non-Commissioned Officers, Lance-Corporals, and Acting Bombardiers. Selected candidates will go through courses in the gunnery and torpedo schools, at the Royal Naval College, Greenwich, and at headquarters, and on completion of these courses they will be embarked in a sea-going ship. After serving six months afloat they will be eligible for promotion to Lieutenants, Royal Marines.

The "afloat" allowance recently approved is much appreciated, and it is hoped that it will have the effect of inducing more men to re-engage after their first period.

Coastguard.

The authorised establishment of Coastguard officers and men is 3130.

The numbers borne on January 1, 1913, were:—

District Captains, District Paymasters and Staff.	35
Divisional Officers	76
Chief Officers and Men	2,962
	3,037

Royal Fleet Reserve.

The new class of the Royal Fleet Reserve, called the "Immediate" Class, has been established, composed of seamen, stokers, and marines under thirty-two years of age who have left the Service before completing time for naval pension. These men are enrolled for a period of five years, and are required to perform twenty-eight days' training on board H.M. ships annually, and to undertake to come into actual service if summoned by the Admiralty on a national emergency. They draw a retainer of 1s. a day so long as they fulfil the conditions of service in the "Immediate" Class, and on completing their service in that class are allowed to re-enrol in Class B. Since the institution of the class last May, 2180 men were enrolled up to December 31st last, the majority of these being transfers from Class B. It is expected that these numbers will be increased during the present year.

The total numbers of the Royal Fleet Reserve have increased

from 24,082 to 25,788, the distribution of these numbers on December 31, 1912, being as follows:—

—	Class A.	Class B.	Intermediate Class.	Total.
Seamen and Naval Police	3,714	8,091	902	12,707
Stokers	2,097	5,055	947	8,099
Marines	1,730	2,921	331	4,982
	7,541	16,067	2,180	25,788

Royal Naval Reserve.

The strength of the Royal Naval Reserve (Home) on January 1, 1913, was—

Officers of the Military Branch	1,219
Commissioned Engineer officers	171
Assistant Paymasters	99
Warrant Engineers	158
Engine Room Artificers	571
Seaman ratings	10,572
Stoker ratings	5,401

Five hundred and sixty-nine of the above Military Branch Officers have undergone twelve months' training in the Fleet, and are in receipt of training fees. In addition to these forty-one are now undergoing this training.

The following numbers have performed courses of instruction and training during the twelve months ended December 31, 1912:—

—	Short Courses.			Annual or Biennial Training.		
	Gunnery and Torpedo.	Signal.	Strategy.	Three Months.	28 Days.	8 or 4 days.
Officers of the Military Branch	129	16	8	—	819	—
Assistant Paymasters	—	—	—	—	73	—
Warrant Engineers	—	—	—	5	—	—
Engine-room Artificers	—	—	—	48	—	—
Seamen ratings	—	—	—	780	3,485	—
Stoker ratings	—	—	—	222	2,224	—
Trawler Section	—	—	—	—	—	241

The training of officers of the Military Branch is carried out, as far as practicable, in ships of the Second Fleet. Many officers who have done twelve months' training in big ships have also been appointed for periodical training in torpedo-boat destroyers, manned with nucleus crews.

Courses of Strategy, International Law, etc., have recently been approved for Royal Naval Reserve Officers of the Military Branch.

The entry and training of Accountant Officers is now arranged on the same lines as that of other branches of the Royal Naval Reserve. The reports received on the training of these officers have been generally satisfactory; it has been decided to increase the establishment from 100 to 120.

As regards engine-room artificers, a good class of candidates, all holding Board of Trade certificates, is generally forthcoming. The training of these ratings is carried out in ships of the First and Second Fleets.

Proposals for the trial of the new scheme of signal instruction to officers and men of the Mercantile Marine were approved early in last year, and instructional courses were begun last April at London and Glasgow. Up to the end of last November 217 officers and 58 men had received instruction.

Royal Naval Volunteer Reserve.

The strength of the force is now six divisions, comprising forty-four companies, the actual numbers being:—

Royal Naval Volunteers.	Establishment.	Strength, Jan. 1, 1913.
Officers	194	170
Honorary Officers	—	25
Petty Officers and Men	4,318	3,944
Permanent Staff—		
Officers	7	7
Petty Officers and Men	78	78

It is now under consideration to form another division on the Forth, and a beginning will be made with three companies of 100 men each, which will be temporarily attached to the Clyde Division.

The strength of the various divisions is as follows:—

Division.	Establishment.	Strength, Jan. 1, 1913.
Bristol	412	392
Clyde	1,126	1,033
London	1,024	918
Mersey	718	654
Sussex	616	504
Tyneside	616	613

During the current financial year the following numbers have embarked for training afloat for fourteen or twenty-eight days in fully-manned ships of the Home Fleet:—

Officers	72
Petty Officers and men	1,240

Forty-one Volunteers qualified for Trade Certificates in engine-room and other skilled naval ratings.

Officers and men have also undergone courses at the various schools in gunnery, torpedo, signalling, and telegraphy during the year, and the following have passed and obtained certificates:—

—	Gunnery.	Torpedo.	Signalling and Telegraphy.	Electrician.	Total.
Officers	24	8	—	—	32
Petty Officers and Men .	54	10	1	1	66

Sixteen medical officers have undergone a fourteen days' course at Haslar Hospital.

The reports of officers and men embarked and under instruction in the schools continue to be most satisfactory.

Signalling instruction has shown a marked improvement in the last two years, due, in a large measure, to the appointment of active service signal-instructors.

Approval has been given for officers of the Military Branch of and above the rank of Sub-Lieutenant to attend the courses of Strategy and International Law which have recently been instituted.

The regulations relative to the new system of R.N.V.R. medical officers have been in force during last year, and fourteen surgeons on the unattached list have been entered.

The annual inspections of all divisions have been carried out, and there has been a steady improvement in the general efficiency, smartness, and physique of the Royal Naval Volunteer Reserve.

Ordnance.

Good progress is being made in the manufacture of ordnance and ammunition, and the reserves of ammunition are fully maintained in spite of the large additions to the Fleet.

The manufacture of improved designs of gun-mountings for new ships building is proceeding satisfactorily. The hydraulic gun-machinery and transferable gun-mountings of the ships which have joined the Fleet during the year have proved successful.

The supply of torpedoes to the Fleet is fully maintained, and improvements in this important weapon, in the direction of increased speed, range, and accuracy, are receiving careful attention. The new torpedo range at Loch Long was opened in August last and is in full working order.

The officers and men of the Fleet continue to show the utmost keenness to achieve the best possible results in the various gunnery practices, and the results, taken as a whole, may be considered very satisfactory. Additional practices have necessitated a small increase in the annual allowance of ammunition, and this addition, it is confidently expected, will result in a definite gain in gunnery efficiency.

Recent developments in all branches of naval ordnance, particularly in the system of fire-control, are being closely studied, and good progress is being made in wireless telegraphy. Additional shore wireless-stations have been erected during the year, and others are nearing completion.

The new Admiralty test-house at Sheffield is working well.

Air Services.

Substantial progress has been made during the year with the newly-formed Air Service. The Central Flying School of the Royal Flying Corps has been established on Salisbury Plain, under the administration of the War Office, and a captain of the Royal Navy has been appointed as the first commandant of the school. Four naval and marine officers have also been appointed on the staff, of whom two have been graded as squadron commanders.

The development of the naval wing is progressing rapidly, and an Air Department has been created at the Admiralty to deal with all questions affecting the air services. Good progress has been made with the aeroplane section at Eastchurch, and close attention is being given to the establishment of air-stations along the coast. The progress with the hydro-aeroplane has been satisfactory. The work of training has been and is proceeding steadily, both at the Central Flying School and Eastchurch.

The needs of the airship section of the naval wing are also being closely studied, and a naval airship station is being established in the Medway. By arrangement with the War Office, officers and men have been trained at Farnborough with the military airship and kite squadrons. Two airships of the Astra Torres and Parseval types have been purchased for instructional and experimental purposes.

Greenwich Hospital.

A beginning has been made with the scheme of reconstruction of the several large blocks of property in East Greenwich which have recently become available on the expiration of the ground leases, and the work of demolition and of re-building the first block is making good progress.

The revenue from both the Greenwich estate and the estates in the north continues to be satisfactory. All important premises are let and there are no farms vacant.

The standard of efficiency of the Royal Hospital School is being well maintained, the grants earned and paid to the funds of Greenwich Hospital by the Board of Education being the highest rates that could have been obtained.

W. S. C.

ADMIRALTY MEMORANDA PUBLISHED IN SEPTEMBER, 1912.

I. Distribution of Admiralty business.

II. Memorandum by the First Lord on the Redistribution of Admiralty Business.

III. Memorandum by the First Lord on Revised Financial Procedure at the Admiralty.

IV. Circular Letter to the Fleet promulgating certain changes in the Regulations affecting disciplinary matters.

I.—DISTRIBUTION OF ADMIRALTY BUSINESS.

The First Lord has approved of the following distribution of Admiralty business, which will come into force forthwith:—

THE BOARD OF ADMIRALTY.

First Lord . . .	General direction of all business.
First Sea Lord . .	Organisation for war and distribution of the Fleet.
Second Sea Lord . .	*Personnel.*
Third Sea Lord . .	*Matériel.*
Fourth Sea Lord . .	Stores and transport.
Civil Lord . . .	Works, buildings, and Greenwich Hospital.
Additional Civil Lord .	Contracts and Dockyard business.
Parliamentary Secretary .	Finance.
Permanent Secretary .	Admiralty business.

DISTRIBUTION OF BUSINESS.

First Lord.

1. General direction and supervision of all business relating to the Navy; political and Board questions.
2. Promotions and removals from the Service of Naval and Marine Officers; honours and rewards.
3. Royal yachts and Admiralty yacht, including appointment of all officers.
4. Appointments of Admirals and Officers in Command, including Engineer Rear-Admirals, Surgeons-General and Deputy Surgeons-General, and Staff appointments of Royal Marines.
5. Chaplain of the Fleet, appointment of, and entry of Naval Chaplains and Instructors.

6. Civil appointments and promotions (higher posts).

7. Naval cadetships and nominations to assistant clerkships, R.N.

First Sea Lord.

1. Preparation for war: All large questions of naval policy and maritime warfare—to advise.

2. Fighting and sea-going efficiency of the Fleet, its organisation and mobilisation, including complements of ships as affecting total numbers; system of gunnery and torpedo exercises of the Fleet, and tactical employment of air-craft, and all military questions connected with the foregoing; Distribution and Movements of all Ships in Commission and in Reserve.

3. Superintendence of the War Staff and the Hydrographic Department.

Second Sea Lord.

1. Manning* and training of the Fleet; details of complements of ships and establishments; barracks, training, and educational establishments, with their complements; also all mobilisation regulations for the *personnel*.

2. Service and appointments of officers of all branches (except as reserved to First Lord).

3. Royal Marines.

4. Coast-guard and Reserve forces.

5. Hospitals.

6. Discipline (*see* Note).

7. Signals.

NOTE.—The following papers are invariably to be marked also to the First Sea Lord:—

(1) Questions of importance relating to discipline.

(2) Questions affecting total Fleet numbers.

Third Sea Lord.

1. Design of *matériel* for the Fleet, including ships and their machinery, armour, naval ordnance and gun mountings, aeroplanes and airships, and docking facilities, also alterations and additions to ships which affect design or fighting efficiency; preparation of estimates of cost of all new construction falling due in any year under current and prospective programmes; superintendence of the departments of the Director of Naval Construction, Engineer-in-Chief, Director of Naval Ordnance, Director of Naval Equipment, Director of Air Department, and Superintendent of Compasses.

* Manning means recruiting the numbers authorised by Parliament,

2. Design questions affecting vessels proposed to be purchased for the Fleet or to be employed in auxiliary services.

3. Inventions relating to ships, machinery, etc.

4. Salvage of vessels, so far as technical and professional considerations are involved.

Fourth Sea Lord.

1. Transport service, including hired auxiliary vessels other than armed merchant cruisers; passages.

2. Superintendence of naval store, fleet coaling, and victualling services; ordnance and medical stores, etc., and all questions relating thereto

3. Full and half pay; allowances and compensations, including table money; prize questions, piloting and surveying pay, and freight of treasure and all extra payments; debts of officers and men; naval and marine pensions and widows' pensions; character, conduct, and badge questions; naval savings banks.

4. Medals; uniform regulations.

5. Naval detention quarters and Bodmin naval prison; deserters —Rewards for apprehension; removals of "R."

6. General salvage money questions, and money demands for salvage of naval stores.

7. Collisions.

Civil Lord.

1. Works and buildings, including purchases of land; Coastguard buildings, sites and leases.

2. Staff of civil establishments (except as reserved to First Lord), including classification, appointment, promotion, pay, allowances, and pension; Dockyard police.

3. Greenwich Hospital business, including appointments (except of naval chaplains to livings, superintendent of the Royal Hospital School, curator of the Painted Hall, and appointments to Greenwich Hospital pensions).

4. Charitable fund, compassionate allowances, subscriptions, etc., and allowances to ministers of religion, and grants in aid of churches and schools.

5. Marine and Dockyard schools.

6. Special questions affecting retirement and pay of naval and Marine officers and men, when discretionary power is specifically provided for by order in council.

NOTE.—Works questions of an important character, or if likely to affect questions dealt with by the Financial Secretary, will be marked to him also.

Additional Civil Lord.

1. Contracts for *matériel* for the Fleet (including ships and their machinery, armour, naval ordnance and gun mountings, aeroplanes and airships), works, yard machinery, and stores of all descriptions; contract arrangements in connection with the disposal, salvage, or loan of vessels or stores; superintendence of the Contract and Purchase Department.

NOTE.—Tenders for ships' hulls and propelling machinery, armour, and important gun and air-craft orders, will also be marked to the Third Sea Lord.

2. General organisation of Dockyards, including provision of labour and plant, and all business questions in connection with the building and repair of ships and their machinery, whether in the Dockyards or in private yards.

Parliamentary and Financial Secretary.

1. Finance, estimates and expenditure generally, and all proposals for new and unusual expenditure.

2. Accounts—Cash, store, and dockyard expense.

3. Purchase and sale of ships, and of stores generally.

4. Payment of hire of ships as armed merchant cruisers, troopships, colliers, freightships, etc.

5. Questions involving reference to the Treasury financially, except the less important works questions dealt with finally by the Civil Lord.

6. Exchequer and Audit Department—Questions connected with.

7. General labour questions, including annual petitions.

Permanent Secretary.

1. General office organisation.

2. Discipline of the clerical staff of the various Admiralty departments.

3. Admiralty procedure.

4. Recommendations for appointments and promotions in the Admiralty Office.

5. Correspondence.

6. Communications with foreign Naval Attachés.

7. Communications with ministers of religion (other than Church of England).

NOTE.—Routine papers, as defined below, will be disposed of by the Permanent Secretary:—

(*a*) Such as require intermediate action or reference to render them sufficiently complete for decision by the Board.

(*b*) Such as do not involve some new principle, establish a precedent, or occasion expense not provided for under existing regulations.

(*c*) Such as do not involve any point of discipline, or affect the movements of or orders to a ship.

In the absence of the Permanent Secretary the Assistant Secretary will act in his place.

NOTES.—(1) It is to be understood that in any matter of great importance the First Sea Lord is always to be consulted by the other Sea Lords, the Civil Lord, the Additional Civil Lord, and the Parliamentary and Permanent Secretaries; but each member of the Board and the Parliamentary and Permanent Secretaries will communicate direct with the First Lord.

(2) The proceedings of Courts-martial will be marked to the Fourth and Second Sea Lords, but will specially pass under review of the Fourth Sea Lord, who will call the attention of the Second Sea Lord to any special point requiring consideration. The latter will consult the First Sea Lord in cases of importance.

II.—MEMORANDUM BY THE FIRST LORD ON THE REDISTRIBUTION OF ADMIRALTY BUSINESS.

The main object of the changes effected in the new Table of Admiralty Business is to divide and reorganise the work of the Controller's Department. Reference should be made to the Minute by the First Lord of January 1, 1912, which explained the reasons for the appointment of an Additional Civil Lord. The work of the Controller had hitherto comprised three principal spheres:—first, the designing of the Fleet; secondly, the administrative construction, equipment and repair of the Fleet; and thirdly, the great group of contract, business and financial questions arising from the second. All these functions are of high importance and all are intimately related, but their character is distinct. The qualifications which fit an officer for the discharge of the duties connected with any one of these groups are quite different from those required for the others, yet the direct responsibility for any one of them is sufficiently important and extensive to occupy one man's time.

2. The first essential has been to set the Third Sea Lord, the officer charged with the supervision of design, free from the complicated contract and financial questions which arise from the construction and repair of the Fleet, and from the business management of the Dockyards. The duties assigned to the Additional Civil Lord will effectually relieve him in that respect. But besides these, he has been burdened by an enormous day to day administration connected with the construction, equipment, repair and refit of ships. These duties cannot in principle be dissociated from him. The Third Sea Lord must exercise a general and covering superintendence over the whole region of *matériel*. But if he is to be free to devote his mind to the progress of naval science and the designing of new ships of all kinds, he must be relieved in practice of these multifarious administrative duties.

3. It may be taken for granted that the designs passed by the Board will, under the existing system of supervision, be correctly executed by the constructive departments or private firms. But the delays which have recently occurred over so large an area of naval shipbuilding show that the work must be continually watched by high naval authority, in respect not only of its design, but of its progress. In this field a large number of important questions of a practical nature are constantly arising, which, under the old system, fell upon the head of the Controller's Department to decide. Refits and repairs not affecting design again require no attention from the Third Sea Lord. But on the other hand the whole work of keeping the Fleet in good repair and getting the ships back to sea demands the constant supervision of a naval officer of considerable standing. Another long series of naval questions of a practical nature are continually arising from this great business and must be settled easily and quickly as they come. No civilian can deal with such matters satisfactorily, and the Third Sea Lord is already fully occupied; for the new guiding principle is to concentrate his attention upon the creative and original task of design, and to free him from administrative distractions.

4. It is therefore proposed to afford the Third Sea Lord, under his general authority, the assistance of a naval departmental officer of flag or senior captain's rank, who will be styled the Director of Naval Equipment, and whose duties will be in effect to supervise, from the naval point of view, the equipment of ships under construction and to deal with technical questions relating to the repair and refit of completed sea-going ships.

5. So far the changes have all been in the direction of lightening the work of the Third Sea Lord. But while he must be restricted

generally to the work of design, it is equally necessary that all the factors which contribute to design shall be within his control, so that he may deal with the whole problem in its integrity. Hitherto the Department of Naval Ordnance and Torpedoes has been assigned to the general supervision of the First Sea Lord. But a warship is primarily a gun platform, and scarcely anything connected with her design can be considered apart from the armament she carries or will have to resist. The association of the Department of Naval Ordnance with the Constructive Departments has, of course, in practice been very close. It must now become absolute; and the genesis of the ideas which govern design must be identical and simultaneous with that which governs the character of weapons and projectiles. The Department of Naval Ordnance and Torpedoes will, therefore, be placed under the Third Sea Lord so far as *matériel* is concerned. But the First Sea Lord will be responsible for the systems of gunnery and torpedo exercises prevailing in the Fleet, the tactical employment of air-craft, and all military questions connected with the foregoing.

6. The duties of the Additional Civil Lord are fully set out in the new table of business. In short they comprise contracts of all kinds for the *matériel* of the Fleet, including ships and their machinery, armour, naval ordnance and gun mountings, aeroplanes, airships, works, yard machinery and stores of all descriptions; also contract arrangements in connection with the disposal, salvage, or loan of vessels or stores. Secondly, the general organisation of dockyards, including the provision of labour and plant, and all business questions in connection with the building and repair of ships and their machinery, whether in the dockyards or in private yards. The Department of Contract and Purchase and the Department of the Director of Dockyards will be placed under the superintendence of the Additional Civil Lord.

General labour questions, including annual petitions, will, however, remain under the Financial Secretary. It is right that labour conditions should be periodically surveyed from a standpoint not exclusively concerned with the business administration of the dockyards; and the present holder of the office of Financial Secretary has besides special knowledge and aptitudes which fit him for this work.

7. The Department formerly presided over by the Controller will thus in future be placed under the superintendence of two members of the Board, viz., the Third Sea Lord and the Additional Civil Lord, and under the control of the former for the purposes already specified there will be a departmental officer, styled the Director of Naval Equipment. But their work, like all Admiralty work, overlaps and

is interdependent. All must work in harmonious combination with each other in close and constant personal intercourse. They will be served for different purposes by the same technical departments, according to the long established custom of the Admiralty. This system, although at first sight somewhat anomalous, is inevitable. It presents no difficulties in practice and is well understood by all concerned. The departments are in fact the foundation which unites the different spheres of the Third Sea Lord, the Director of Naval Equipment, and the Additional Civil Lord, and by their common science prevent the risks of technical discordance.

With these changes the title of Controller as an addition to that of Third Sea Lord will disappear.

8. These changes have been most carefully considered in regard to the persons who will occupy the various positions at the present time. The arrangements must now be proved and tested in actual working to see how far they give effect to the principles laid down in the First Lord's Minute of January 1st, and what further improvements in their application are possible.

III.—MEMORANDUM BY THE FIRST LORD ON REVISED FINANCIAL PROCEDURE AT THE ADMIRALTY.

Simultaneously with the new Table of Distribution of Business now authorised, it is desirable to revise in certain respects the regulations and procedure of Admiralty finance. Such revision was already under consideration when the change in the constitution of the Board took place in October, 1911. The subject of financial control within the Admiralty has been dealt with from time to time in a series of official memoranda, the last of which was issued in 1904. The large and progressive increases in the volume of work require additional measures to ensure that proposals for new expenditure and annually recurring charges are thoroughly considered in their financial aspect.

By the Table of Distribution of Business the Parliamentary and Financial Secretary is responsible under the First Lord for the finance of the Admiralty. At the request of the late First Lord, the Financial Secretary examined the existing procedure, and prepared a report showing how the official machinery might be improved so as to assist him in his work and at the same time provide an improved means of enquiry into departmental finance.

Having regard to the relations of the various departments to each other and to the Board, it is recognised that the most efficient method

of maintaining proper financial control over the expanding business of the Admiralty lies in the establishment on a more formal and responsible basis of the Finance Committee.

The Finance Committee will consist of the Parliamentary and Financial Secretary (who will be the President of the Committee), the additional Civil Lord, the Secretary or Assistant Secretary of the Admiralty, the Accountant-General, and the Assistant Secretary for Finance Duties, who will also act as Secretary. Additional members will be associated with the Committee for special enquiries when necessary.

It will be the function of the Committee (*a*) to assist and advise the Parliamentary and Financial Secretary as he may require in the discharge of the financial duties specially assigned to him; (*b*) to review in regular rotation the expenditure of each Department or Branch, having particular regard to recurrent charges, and to render a report upon each for the consideration of the Board; (*c*) to examine any proposals for new expenditure, etc., which may be referred to them by the First Lord, or by any other member of the Board, upon questions with which such member is principally concerned, the report thereon to be referred back to the First Lord or the Member of the Board initiating the reference; (*d*) to consider the monthly statement prepared by the Accountant-General and report upon the progress of all Admiralty expenditure, current and prospective, including the outstanding liabilities, how they will fall on future years, and what alterations and revisions have been caused during the month. Action in regard to this statement implies no responsibility for policy, but only for an accurate presentment of its effect on annual finance.

In the course of the inquiries of the Committee, the heads of the spending departments will attend the meetings of the Committee as may be necessary in connection with the particular business of their respective departments, and will be responsible, after due notice, for all arrangements being made so as to facilitate the fullest examination of expenditure dealt with by the Department. Whenever the expenditure of any department or branch is under review, as at (*b*), the Superintending Lord will be informed, and it will be at his option to attend the meetings of the Committee. The report of the Committee will be communicated to the Superintending Lord.

The principal officers of the Admiralty will be held responsible, as hitherto, for keeping a careful watch over the expenditure they recommend or incur.

The Accountant-General will be responsible, as hitherto, for the preparation of the Navy Estimates and Accounts; for reviewing the

expenditure under those estimates, for satisfying himself that no expenditure is allowed except under proper authority, and that all expenditure chargeable to naval funds is brought to account correctly; for advising as to any redistribution or transfers between Votes which may from time to time be found necessary; or discharging all the duties and responsibilities of the Accounting Officer for Navy Votes, Accounts, and Funds; and generally for reporting upon all proposals involving the expenditure of naval funds. The Accountant-General is not only to be made acquainted with expenditure after it has been incurred, but is to be referred to on all matters involving expenditure of naval funds which is not provided for in the Estimates, prior to any liability being incurred.

It will be the duty of the several principal officers to keep the Accountant-General informed of all current liabilities, and it will be the duty of the Accountant-General to keep himself thoroughly acquainted with the progress of such liabilities, to obtain such explanations from the various Departments as will enable him to appreciate the financial result of those liabilities, and to bring to the notice of the Parliamentary and Financial Secretary any matters demanding attention. He is further empowered to determine the form in which liabilities are to be recorded by the spending departments, and to call on the departments concerned for explanations in regard to all liabilities incurred on ordinary or special Votes.

IV.—DISCIPLINE.

The following circular letter dealing with naval discipline has been issued to the Fleet. The question of the procedure in connection with the disrating of Petty Officers has also received their Lordships' consideration, and will be the subject of a separate circular letter.

Circular Letter.
No. 32.
N.L. 15545.

ADMIRALTY, S.W.,
September 7, 1912.

My Lords Commissioners of the Admiralty have had under consideration the recommendations of a Committee appointed by them to enquire into disciplinary matters in general, and particularly into the system of summary punishments in force as laid down in Section V. of Chapter XIX. of the King's Regulations and Admiralty Instructions, and have approved of the changes shown on the following pages being introduced from the

date of receipt of this circular. Further changes will be notified at an early date and the necessary amendments to the King's Regulations and Admiralty Instructions will be promulgated in due course.

By command of Their Lordships,
W. GRAHAM GREENE.

To all Commanders-in-Chief, Captains, Commanders and Commanding Officers of H.M. Ships and Vessels at Home and Abroad.

Enclosure to Circular Letter No. 32 of September 7, 1912.
Reduction to the Second Class for Conduct.

1. Reduction to the second class for conduct is especially suitable for men who have been guilty of gross insubordination or of dishonesty (if retained in the Service), and also for men for whose continual slackness or other misconduct the repeated award of minor punishments has proved ineffective.

2. Men in the second class for conduct should be mustered at such times as the Captain may consider desirable, and they should also be given such extra drill in the dog watches, not exceeding one hour a day, as the Captain may consider necessary for their improvement.

3. When a man in the first class for leave is reduced to the second class for conduct he is also to be reduced to the second class for leave in accordance with the existing rule.

4. The period ordinarily spent in the second class for conduct is to be six months, but the Captain may restore any man to the first class for conduct at any time after three months should he be satisfied with the man's behaviour and have reason to believe that he wishes to reform. Restoration to the first class is never to be delayed beyond six months from the date of reduction.

5. The regulations which direct—

(*a*) that men whose characters are assessed below "good" for any complete year ending December 31st are to be placed in the second class for conduct; and

(*b*) that certain punishments, *e.g.*, imprisonment, are necessarily to involve reduction to the second class for conduct,

are cancelled.

6. All men who are in the second class for conduct in

consequence of an award of "fair" character are to be restored to the first class as from September 7th.

7. Men who have been placed in the second class automatically in consequence of a sentence of detention may also be restored as from September 7th at the discretion of their Captains, provided they have been recommended by the Captain of the detention establishment under the provisions of Circular Letter No. 33 of October 16th last, N.L. 532.

Leave.

8. The present system of classification for leave is abolished, and the first class for leave is in future to consist of all ratings, except habitual leave-breakers, men in the second class for conduct, and men who have continuously or grossly misconducted themselves on shore.

9. The second class for leave is to consist of men in the second class for conduct and of men who, by breaking their leave frequently or for long periods or by gross or continued misconduct on shore, show themselves unfit for the privileges accorded to the rest of the ship's company.

10. Men in the second class for leave are to be allowed on shore at the discretion of the Captain, but never less frequently than once a month, provided the service upon which the ship is engaged admits.

11. Men possessing good conduct badges may be reduced to the second class for leave, but only after deprivation of all badges.

12. Subject to the rule that men in the second class for conduct are to be in the second class for leave, men in the second class for leave who for three consecutive months have committed no offences connected with leave are to be restored to the first class for leave.

13. Occasions may arise when the Captain may desire to give leave but, owing to the inconvenience which would be caused if there were any leave-breaking, may be reluctant to grant the privilege to all the men in the first class for leave. A list should therefore be kept of ratings who have never been punished for leave-breaking since they joined the ship. This list should only be made use of on very special occasions, and is not to be considered as constituting a class for leave in the ordinary sense.

14. Chief Petty Officers in the first class for leave are to be granted leave, irrespective of their watches, whenever the service admits, and it is not intended to interfere with the existing practice of granting leave to Chief Petty Officers only, or to Chief Petty

Officers and Petty Officers only, in particular circumstances, *e.g.*, owing to the advisability of specially restricting the number of men ashore, want of landing facilities, etc.

Punishment for Leave-breaking.

15. In order to secure greater uniformity in the punishment of leave-breaking the following scheme is to be substituted for the present system laid down in Articles 781 to 783 of the King's Regulations. The mulct of one day's pay for returning from leave drunk is, however, still to be enforced.

(*a*) Ratings breaking leave are to be fined one day's pay for each of three hours or part of three hours for the first thirty-six hours of improper absence, and for the remainder of such absence to be fined one day's pay for each six hours or part of six hours. A day's leave also to be stopped for each day's pay forfeited.

(*b*) For leave-breaking for periods up to thirty-six hours of improper absence (except in aggravated or repeated cases) the punishment is to consist of forfeiture of pay and stoppage of leave on the above scale *only*, but the Captain may, in special circumstances, reduce the fine by such an amount as he considers reasonable.

(*c*) For leave-breaking for periods over thirty-six hours of improper absence or aggravated or repeated cases of leave-breaking for shorter periods, offenders should, as a rule, be dealt with under Summary Punishments 4A to 10 of Article 744, Table II., King's Regulations, according to the degree of the offence, in addition to the forfeiture of pay and stoppage of leave on the above scale, and in aggravated or repeated cases may also be placed in the second class for leave.

(*d*) Stoppage of leave for periods in excess of this scale is not to be awarded as a punishment for leave-breaking except in aggravated or repeated cases, and ratings should not be reduced to the second class for conduct for leave-breaking unless they are already in the second class for leave.

16. Arrangements are to be made, whenever possible, to give all liberty men the opportunity of returning to their ships to sleep.

17. In view of the serious consequences involved in the deprivation of a good-conduct badge, a single case of returning drunk is not to entail the loss of a badge. This instruction does not apply to Petty Officers, who are to be dealt with at the Captain's discretion.

18. A man who, without breaking his leave, returns from leave drunk is, unless he otherwise misconducts himself, to be deprived of

one day's pay without other punishment. If he has returned from leave drunk on any previous occasion since he joined the ship, or if besides being drunk he otherwise misbehaves, additional punishments may be imposed.

No. 10 *A. Punishment.*

19. This punishment in its present form is abolished and the following is to be substituted:—

Grog to be stopped.

To turn out half an hour before the hands.

To do extra work during non-working hours from half an hour before the hands turn to until 9 p.m., one hour of which during the dog-watches to be, if possible, drill or boat-pulling.

To be constantly mustered.

To have full time for meals, except dinner, for which three-quarters of an hour will be allowed; to be employed for remainder of dinner-hour at drill or work.

20. Extra work is, when possible, to be done in the department to which the offender belongs. During the time allotted to extra work the men are to be told off for some definite duty under a petty officer, and are not to be allowed to be idle; a portion of the time may, however, if necessary, be devoted to extra drill.

21. If a man has to keep watch, either in harbour or at sea, this punishment is to cease at 8 p.m., and he is not to be turned out before the usual time.

22. Men undergoing this punishment are to be allowed to smoke during the period allotted for their meals, and, if the routine of the ship admits, after 9 p.m. They are to have their meals in their messes.

23. The following is suggested as a suitable routine for men undergoing this punishment:—

Turn out half an hour earlier than the hands, fall in with hammocks for inspection by officer of the watch; then work on upper deck.

Fall in five minutes before each meal during the day, including the issue of morning cocoa.

12.45 to 1.15 p.m. squad, rifle, or other drill or extra work.

After tea, one hour at boat-pulling, drill, physical drill, or a combination of all; if not practicable, extra work; work till supper.

After supper fall in, work till 9 p.m.

9 p.m., fall in, finally inspected and dismissed.

Other Summary Punishments.

24. Chief Petty Officers who cannot be disrated may be awarded imprisonment or detention summarily for any of the offences specified in Article 756, Clause 4, of the King's Regulations.

25. No. 10 B punishment (stoppage of grog and standing on the upper deck) and No. 18 (standing on the upper deck) are abolished.

26. Deductions from pay under Article 1368 of the King's Regulations (loss of stores, etc.) are not to be considered as punishments, and No. 13 in the table of summary punishments is therefore cancelled.

27. No. 15 punishment (stoppage of grog) is to be applicable to Chief Petty Officers for offences comprised under the heading of drunkenness.

28. No. 16 punishment (carrying hammock or bag) is, in its present form, abolished, and a punishment is to be substituted for it consisting of extra work or drill for not more than two hours a day for a period not exceeding seven days. Such extra work or drill should not entail any deprivation of the recognised time allotted to the various meals. This punishment may be awarded for one day by the officer of the watch, the officer of the day, or the Senior Engineer (*see* paragraphs 31–34).

Award of Punishment by Officers in command below the rank of Commander.

29. Except in time of war or, in the case of ships abroad, when on detached duty for long periods, officers in command below the rank of Commander are not to inflict punishments which require warrants, except with the approval of an officer of or above the rank of Commander. Commanders-in-Chief and Senior Officers of Fleets or Squadrons are to issue such orders as may seem to them best calculated to ensure this being carried out in the ships and establishments under their command. The same rule is to apply when officers below the rank of Commander are temporarily in command of ships in the absence of the Captain.

30. As regards the method of dealing with offences committed by men in a tender in the absence of the Captain from the parent ship, it has been decided that, when necessary, the Captain of the parent ship may delegate his powers of punishment, subject to the above restrictions, to the Senior Officer of the tenders present, should the latter be senior to the officer temporarily in command of the parent ship. The Senior Officer of the tenders present should not, however,

assume the duties of Commanding Officer of the parent ship for other purposes.

Award of Punishment by the Officer of the Watch, Officer of the Day, and Senior Engineer.

31. In order to provide for the many trifling cases which now go through the formality of the Commander's report and become invested with an importance which they do not deserve, the Captain is authorised to delegate to the officer of the watch or officer of the day, if of the rank of Lieutenant in both cases, the power to award extra work or drill for a period not exceeding two hours. Such extra work or drill is not to entail any deprivation of the recognised time allotted for the various meals.

32. The same power may, with the Captain's approval, be exercised, as regards the stoker ratings for offences connected with the work of their department, by the Senior Engineer, or, in ships with only one officer of the Engineer branch, by the Engineer Officer, provided that such Engineer Officer or Senior Engineer is not below book the rank of Engineer Lieutenant.

33. These punishments are not to appear in the conduct book or daily record, but are to be entered in a special book, to be signed by the officer at the time, examined and initialled by the Executive Officer daily, and signed by the Captain weekly. This book is to be produced at all inspections.

34. When young or inexperienced officers are doing duty as officer of the watch in harbour, the Lieutenant told off as officer of the day is to investigate all complaints and reports, and he is to be invested with the power of awarding extra work instead of the officer of the watch. The latter, however, should also be present at the investigation in order to gain experience on disciplinary matters.

35. Similarly, at sea, when it is important that the attention of the officer of the watch should not be distracted from his duties on the bridge, the Captain may detail a Lieutenant as officer of the day for disciplinary purposes.

Appeals from the Lower Deck.

36. It appears to be a growing custom for Petty Officers and men who think they have a grievance in regard to the manner in which they have been treated for some offence against discipline to obtain the assistance of persons unconnected with the Service to write to

the Admiralty on their behalf. This practice is injurious to the welfare and discipline of the Service, and should be checked.

37. Should any Petty Officer or man consider that he has been treated unjustly in any way, he may, after the lapse of at least twenty-four hours, request to see his Captain, to whom he should state his grievance verbally, and should the Captain refuse or be unable to remedy it, he may respectfully request that his complaint in writing should be forwarded as provided in Article 8 of the King's Regulations. He is to be given twenty-four hours to reconsider his application, and is to be allowed the advice and assistance of an officer in stating his case, but the officer is to warn him that, should there be no reasonable grounds for his grievance, he is liable to be treated as having made a frivolous or vexatious complaint, which is an act to the prejudice of good order and naval discipline. Although the superior authority to whom the matter has been submitted may not see fit to alter the ruling of the Captain, the latter is not thereby justified in dealing with the appeal as a breach of discipline, and is only to do so when expressly authorised by such superior authority.

38. The procedure detailed in paragraph 37 will alone be recognised and should be made widely known on the lower deck. All ratings, especially new entries, are to be carefully instructed as to the proper course to be followed, and are to be warned that any departure from it will be a direct disobedience of orders involving the usual penalties. They should further be informed that no answer to any appeal can be expected unless the above procedure is followed.

Money Lending.

39. Money lending at interest is prohibited.

Gambling and Card-playing.

40. Card-playing is to be allowed in all ships and establishments under such restrictions as the Captain may consider necessary to prevent gambling.

Ship's Police.

41. The utmost care should be taken in selecting candidates for ship's police ratings.

42. The ship's police are to be used entirely as police, and care is to be taken that they are not given powers they were never intended to possess. In particular the Executive Officer is to avoid depending upon the ship's police in matters which he should direct personally.

43. The detailing of men for their various duties is in all cases to be carried out under the direct orders of the Executive Officer, and there should be no possibility of any alterations being made by the ship's police without his sanction. Ship's police should have nothing to do with the routine work of decks, nor are they to interfere with the men except to prevent crime or when dealing with offenders. The care and cleanliness of mess decks, etc., is to be entirely in the hands of the Petty Officers (under the responsible officers), who should not be interfered with by the ship's police unless some breach of the regulations occurs.

Night Leave for Young Men.

44. Young men and boys, except those whose ships are at ports where their own homes are situated, or unless in other special circumstances, are not to be allowed all-night leave until they become able seamen, stokers, first class, or equivalent ratings, or reach the age of twenty.

45. In barracks, etc., ships alongside dockyards, or in enclosed harbours where it is easy to bring men off at night, they should be granted the ordinary leave whenever it is given to men in their class for leave, but they are not to be allowed to sleep ashore. In other places where there may be a doubt about the advisability of sending for them at night, they are to return to their ships in time for supper, and, in these circumstances, in order to give them a reasonable amount of leave in comparison with the older members of the ship's company, they should, when possible, be allowed to land on two afternoons a week at 1.30 p.m.

Award of Ability.

46. The number of men in each ship or establishment awarded "exceptional" for ability in rating is in future not to exceed:—

(*a*) Four per cent. of the total numbers of ratings borne, in ships with over 400, or

(*b*) Five per cent in ships with 400 or less.

This number should be distributed among the various departments of the ship, or to one or more of them, at the discretion of the Commanding Officer, but no attempt should be made to bring the number of "exceptional" awards up to the maximum authorised.

47. Should there be in any ship or establishment a number of ratings considered worthy of the award of "exceptional" in excess of

the percentage authorised in paragraph 46, the Commanding Officer may apply to the Commander-in-Chief or Senior Officer of the station or squadron for permission to award the additional number.

48. When the Commanding Officer assesses men's abilities at the end of the year, he is to send to the Commodore of the depôt to which the men belong a list of those to whom "exceptional" is awarded, in order that their names may be noted for advancement. In cases where the percentage of "exceptional" awards authorised in paragraph 46 is exceeded, the list should be accompanied by the written approval of the Commander-in-Chief or Senior Officer.

STATEMENT showing the GROSS EXPENDITURE on NAVAL SERVICES for the years 1909–1910 to 1911–1912, together with the ESTIMATED GROSS EXPENDITURE for 1912–1913 and 1913–1914.

—	ACTUAL EXPENDITURE.			ESTIMATED EXPENDITURE.	
	1909–1910.	1910–1911.	1911–1912.	1912–1913.	1913–1914.
	£	£	£	£	£
Gross Expenditure (Navy Vote)	37,385,460	42,441,420	44,384,340	45,949,292 (a) 990,000	48,333,194
Abate: Annuity under the Naval Works Acts, 1895 to 1905	1,325,809	1,322,752	1,322,752	1,322,752	1,311,558
	36,059,651	41,118,668	43,061,588	44,626,540 (a) 990,000	47,021,636
Value of Stores drawn from stock, without replacement, in aid of cash expenditure ...	155,900	20,750	40,160	66,000	25,000
Expenditure on behalf of Naval Services from Votes of other Departments	383,741	380,413	378,270	382,184	392,423
TOTAL	36,599,292	41,519,831	43,480,018	45,074,724 (a) 990,000	47,439,059

(a) Supplementary Estimate, 17th July, 1912 (Parliamentary Paper No. 254).

Abstract of Navy

Votes.		Estimates, Gross Estimate.	Appropriations in Aid.
	I.—Numbers.		
A.	Total Number of Officers, Seamen, Boys, Coast-guard, and Royal Marines	146,000	....
	II.—Effective Services.	£	£
1	Wages, &c., of Officers, Seamen and Boys, Coast-guard, and Royal Marines	8,537,200	138,000
2	Victualling and Clothing for the Navy	3,729,028	799,028
3	Medical Establishments and Services	290,810	18,610
4	Martial Law	3,460	60
5	Educational Services	228,025	68,325
6	Scientific Services	97,270	31,070
7	Royal Naval Reserves	480,201	4,201
8	Shipbuilding, Repairs, Maintenance, &c.:		
	Section I.—*Personnel*	4,089,500	26,400
	Section II.—*Matériel*	6,462,000	610,400
	Section III.—Contract Work	12,333,790	107,490
9	Naval Armaments	4,521,600	125,600
10	Works, Buildings, and Repairs at Home and Abroad	3,481,500	33,500
11	Miscellaneous Effective Services	600,045	9,345
12	Admiralty Office	459,062	9,062
	Total Effective Services £	45,313,491	1,981,091
	III.—Non-Effective Services.		
13	Half-Pay and Retired Pay	1,022,094	16,294
14	Naval and Marine Pensions, Gratuities, and Compassionate Allowances	1,588,186	26,086
15	Civil Superannuation, Compensation Allowances, and Gratuities	409,423	423
	Total Non-Effective Services . £	3,019,703	42,803
	Grand Total . . £	48,333,194	2,023,894

Provision to the extent of £5,000 is included in the Estimates for 1913-1914 under Vote 8, for the Acts, 1895 to 1905.

In addition to the Cash expenditure, stocks of Stores purchased in previous years

Estimates for 1913–1914.

1913–1914.	Estimates, 1912–1913.			Difference on Net Estimates.		Votes.
Net Estimate.	Gross Estimate.	Appropriations in Aid.	Net Estimate.	Increase.	Decrease.	
Total Numbers. 146,000	136,000 (a) 1,500	....	Total Numbers. 136,000 1,500	Numbers. 8,500	Numbers.	A.
£	£	£	£	£	£	
8,399,200	7,801,500 (a) 60,000	174,500	7,627,000 60,000	712,200	....	1
2,930,000	3,359,437 (a) 54,000	731,337	2,628,100 54,000	247,900	....	2
272,200	289,965	20,065	269,900	2,300	....	3
3,400	3,600	100	3,500	....	100	4
159,700	218,885	66,385	152,500	7,200	....	5
66,200	103,789	31,789	72,000	....	5,800	6
476,000	436,432	9,732	426,700	49,300	....	7
						8
4,063,100	3,515,800 (a) 35,000	22,000	3,493,800 35,000	534,300	....	Sec. I.
5,851,600	5,457,100	380,300	5,076,800	774,800	....	Sec. II.
12,226,300	13,230,600 (a) 611,000	175,000	13,055,600 611,000	....	1,440,300	Sec. III.
4,396,000	4,064,700 (a) 200,000	145,700	3,919,000 200,000	277,000	....	9
3,448,000	3,547,000 (a) 30,000	82,000	3,515,000 30,000	....	97,000	10
590,700	545,386	13,386	532,000	58,700	....	11
450,000	437,350	8,850	428,500	21,500	....	12
43,332,400	43,011,544 (a) 990,000	1,811,144	41,200,400 990,000	2,685,200	1,543,200	
1,005,800	977,212	21,412	955,800	50,000	....	13
1,562,100	1,547,126	30,926	1,516,200	45,900	....	14
409,000	413,410	410	413,000	....	4,000	15
2,976,900	2,937,748	52,748	2,885,000	95,900	4,000	
46,309,300	45,949,292 (a) 990,000	1,863,892	44,085,400 990,000	2,781,100	1,547,200	

Net Increase £1,233,900

(a) Supplementary Estimate, 17th July, 1912 (Parliamentary Paper, No. 254).

continuation of services originally provided for out of funds raised under the authority of the Naval Works

will be drawn upon without replacement to the extent of £25,000 (estimated).

STATEMENT of the Principal Points of **DIFFERENCE** between the **ESTIMATES** of 1912–1913 and those for 1913–1914.

INCREASES.		£
Wages, &c., of Officers, Seamen and Marines		675,900
Victualling and Clothing for the Navy		235,800
Educational Services		7,200
Royal Naval Reserves		44,000
Wages of Artificers and Police in Dockyards		529,382
Naval Stores, and Fuel, &c., for the Fleet		897,700
Auxiliary Machinery, &c., for His Majesty's Ships and Vessels (Contract)		78,146
Repairs and Alterations by Contract of Ships, &c.		10,000
Inspection of Contract Work		22,000
Naval Ordnance Establishments, and Naval Ordnance Stores		273,350
Miscellaneous Effective Services		54,100
Non-Effective Services		78,800
Miscellaneous Increases		34,478
Decrease in Amount of Contribution from the Australian Commonwealth towards Naval Expenditure		158,400
	£	3,099,256
DECREASES.	£	
Scientific Services	5,800	
Increase in Amount of Receipts arising from the Sale of Ships	143,300	
Propelling Machinery for His Majesty's Ships and Vessels (Contract)	572,946	
Hulls of Ships (Contract)	159,940	
Armour for His Majesty's Ships and Vessels (Contract)	544,291	
Gun Mountings and Air-Compressing Machinery (Contract)	279,379	
Machinery for His Majesty's Shore Establishments (Contract)	62,700	
Works, Buildings, and Repairs	97,000	
		1,865,356
Net Decrease	£	1,233,900

STATEMENT showing the Total Estimated **EXPENDITURE** for the **NAVAL SERVICE**, including Amounts provided in the **NAVY ESTIMATES**, as well as in the **CIVIL SERVICE** and other **ESTIMATES**, for the following Services:—

——		1913–1914.	1912–1913.
		£	£
NAVY ESTIMATES:			
Estimated Expenditure (after deducting Appropriations in Aid)		46,309,300	44,085,400 (b) 990,000
CIVIL SERVICE ESTIMATES: (a)			
Estimated Expenditure under—			
Class I. Vote 10.—Public Buildings, Great Britain:	£		
Maintenance and Repairs, including New Works, Alterations, &c.	10,650		
Rents, Insurance, Tithes, &c.	5,540		
Fuel, Light, Water, &c.	6,500		
Furniture	4,500		
		27,190	22,540
Class I. Vote 11.—Surveys of the United Kingdom		4,550	4,500
„ I. „ 14.—Rates on Government Property		153,500	149,000
„ I. „ 15.—Public Works and Buildings, Ireland:			
Coast-guard, viz.:	£		
Purchase of Sites	—		
New Works and Alterations, including Naval Reserve Stations	6,385		
Maintenance and Supplies	4,868		
Naval Reserve, viz.:			
Maintenance and Supplies	20		
		11,273	11,220
Class II. Vote 8.—Board of Trade:			
Staff and Incidental Expenses in connection with the Royal Naval Reserve Force		3,250	3,294
„ II. „ 9.—Mercantile Marine Services:			
Staff and Incidental Expenses in connection with the Royal Naval Reserve Force		2,500	2,500
„ II. „ 13.—Government Chemist:			
Analysis of Food, &c.		400	400
„ II. „ 15.—Exchequer and Audit Department (Cost of Audit):	£		
Navy Cash Accounts	5,300		
Expense and Manufacturing Accounts	3,830		
Store Accounts	4,013		
		13,143	14,639
Class II. Vote 24.—Stationery and Printing		112,000	118,000
„ III. „ 1.—Law Charges, England		17,052	11,477
Maintenance of Naval Prisoners:			
„ III. „ 8.—Prisons, England and the Colonies		1,260	630
„ III. „ 11.—Law Charges and Courts of Law, Scotland		100	..
„ III. „ 14.—Prisons, Scotland		200	300
„ III. „ 15.—Law Charges and Criminal Prosecutions, Ireland		70	..
„ III. „ 21.—Prisons, Ireland		383	397
REVENUE DEPARTMENT ESTIMATES:			
Vote 1.—Customs and Excise.—Percentage for provision of funds for District Paymasters of the Coast-guard, &c.		252	297
Vote 1.—Customs and Excise.—Staff and Incidental Expenses in connection with the Royal Naval Reserve Force		3,300	3,300
Vote 3.—Post Office		42,000	39,690
Total £		46,701,723	44,467,584 (b) 990,000

(a) Provision is also made in the Estimate for Osborne (Class I., Vote 2) for expenditure in connection with the treatment of invalid Officers of the Navy in the Convalescent Home at Osborne, and in the Vote for Public Buildings, Great Britain (Class I., Vote 10) for Annuities in repayment of sums advanced for sites and buildings under various Acts.

(b) Supplementary Estimate, 17th July, 1912 (Parliamentary Paper, No. 254).

Note.—In addition to the Services shown above, an annuity of £16,243 18s. is payable to the Commissioners of Woods, &c., from the Consolidated Fund, under the Public Offices Sites Act of 1882 (45 & 46 Vict. c. 32).

STATEMENT showing the CONTRIBUTIONS from INDIA and the COLONIES towards NAVAL EXPENDITURE.

RECEIVED FROM.	NATURE OF SERVICE.	VOTE.														TOTAL.
		1	2	3	6	7	8			9	11	12	13	14	15	
							Section I.	Section II.	Section III.							
		£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
India	Maintenance of His Majesty's Ships in Indian Waters . .	28,000	9,100	500	..	..	12,500	10,200	13,000	11,600	2,500	..	4,300	8,300	..	100,000
India	Indian Troop Service (on account of work performed by the Admiralty) . . .	..	..	..	..	..	..	..	..	..	..	3,050	..	..	350	3,400
India	Repayment on account of services rendered by His Majesty's Ships engaged in the suppression of the Arms Traffic in the Persian Gulf . .	25,000	7,000	200	..	..	..	15,550	4,500	4,000	700	..	2,200	4,850	..	64,000
Australian Commonwealth Dominion of Canada	Contributions on account of liability for Retired Pay of Officers and Pensions of Men lent from the Royal Navy	..	..	..	..	..	..	..	..	..	..	..	4,700	6,100	..	10,800

Australian Commonwealth	Survey of the N.-W. coast of Australia .	3,900	1,300	..	550	..	200	1,550	..	..	..	..	..	..	..	7,500
	Maintenance of an Australasian Squadron and of a branch of the Royal Naval Reserve	36,200	10,800	350	..	1,000	..	18,100	56,000	3,250	4,100	..	5,000	6,800	..	41,600
Dominion of New Zealand	Maintenance of an Australasian Squadron and of the Imperial Navy generally, also of a branch of the Royal Naval Reserve															100,000
Union of South Africa	General maintenance of the Navy . .	18,800	7,800	..	..	..	8,300	15,500	24,000	10,600	..	..	..	..	..	85,000
Newfoundland .	Maintenance of a branch of the Royal Naval Reserve . .	..	..	..	..	3,000	..	..	..	..	..	..	..	..	..	3,000
	Total . . £	111,900	36,000	1,050	550	4,000	21,000	60,900	97,500	29,450	7,300	3,050	16,200	26,050	350	415,300

VOTE (A).

NUMBERS of OFFICERS, SEAMEN and BOYS, COAST-GUARD, and ROYAL MARINES Borne on the Books of His Majesty's Ships, and at the ROYAL MARINE DIVISIONS.

One Hundred and Forty-six Thousand.
(146,000.*)

I.—SEA SERVICE.

Under which Vote Provided.	RANKS, &c.	NUMBERS, ALL RANKS. 1913–1914.		NUMBERS, ALL RANKS. 1912–1913.		Numbers of all Ranks borne on 1st January, 1913.
Vote 1	**FOR HIS MAJESTY'S FLEET:**					
	Flag Officers	29		28		
	Commissioned Officers	5,264		4,727		
	Subordinate Officers	657		740		
	Warrant Officers	1,905		2,070		
	Petty Officers and Seamen	102,718		98,036		
	Boys (Service)	4,479	115,052	2,926	108,527	109,026
	COAST-GUARD:					
	Commissioned Officers	102		99		
	Chief Officers and Second Mates	198		205		
	Petty Officers and Seamen	2,830	3,130	2,796	3,100	3,053
	ROYAL MARINES (for Service Afloat and on Shore):					
	Commissioned Officers	422		420		
	Warrant Officers	80		67		
	Staff Sergeants and Sergeants	1,302		1,300		
	Band Ranks, Buglers and Musicians	1,762		1,708		
	Rank and File	14,401		13,546		
	Band Boys	268	(a) 18,235	272	17,313	17,522
	Total		136,417		128,940	129,601
	Net Increase		7,477			

* Maximum for the year. The estimated average is 142,560.
(a) Including 30 Officers, &c., Sub-Heads F and H.

VOTE (A)—*continued.*

II.—OTHER SERVICES.

Under which Vote Provided.	RANKS, &c.	NUMBERS, ALL RANKS. 1913–1914.		NUMBERS, ALL RANKS. 1912–1913.		Numbers of all Ranks borne on 1st January, 1913.
Vote 1	Naval Cadets	845		820		
	Pensioners in Home Ships, &c.	310		299		
	Boys under Training—					
	Seaman Class	5,972		4,981		
	Artificer Class	620	(b) 7,747	596	6,696	6,621
Vote 2	For Victualling and Clothing for the Navy	1		7		
Vote 3	For Medical Establishments and Services	724		769		
Vote 5	For Educational Services	565		552		
Vote 6	For Scientific Services	3		3		
Vote 7	For Royal Naval Reserves	67		63		
Vote 8	For Shipbuilding, Repairs, Maintenance, &c.:					
	Section I.	284		245		
	Section II.	6		15		
	Section III.	87		90		
Vote 9	For Naval Armaments	58		81		
Vote 12	For Admiralty Office	41	1,836	39	1,864	1,874
	Total		(c) 9,583		8,560	8,495
	Net Increase		1,023			

	1913–1914.		1912–1913.	
Total, Sea Service	136,417		128,940	
„ other Services	9,583	146,000	8,560	137,500
Net Increase		8,500		

(b) Including 16 Officers, Sub-Head H.

(c) Including Officers and Seamen	2,421	..	2,483
„ Retired Officers and Pensioners (Vote 1)	310	..	299
„ Boys (Training, Seaman Class)	5,972	..	4,281
„ Boys (Training, Artificer)	620	..	596
„ Boys (Training, Artisan)	145	..	64
„ Royal Marines	115	..	137
	9,583	..	7,860

2 H

VOTE 8.

SHIPBUILDING, REPAIRS, MAINTENANCE, &c.

I.—ESTIMATE of the SUM which will be required, in the YEAR ending 31st March, 1914, to defray the EXPENSES of SHIPBUILDING, REPAIRS, MAINTENANCE, &c., including the COST of ESTABLISHMENTS of DOCKYARDS and NAVAL YARDS at HOME and ABROAD.

DOCKYARD WORK.

SECTION I.—PERSONNEL.—Four Million and Sixty-Three Thousand One Hundred Pounds.

(£4,063,100.)

SECTION II.—MATÉRIEL.—Five Million Eight Hundred and Fifty-one Thousand Six Hundred Pounds.

(£5,851,600.)

CONTRACT WORK.

SECTION III.—CONTRACT WORK.—Twelve Million Two Hundred and Twenty-six Thousand Three Hundred Pounds.

(£12,226,300.)

(Total of the Three Sections of Vote 8 . . **£22,141,000.)**

II.—SUB-HEADS under which SECTION I., PERSONNEL, of this VOTE will be accounted for.

DOCKYARD WORK. SECTION I.—PERSONNEL.	ESTIMATES. 1913–1914.	ESTIMATES. 1912–1913.	Increase.	Decrease.
Dockyards at Home.	£	£	£	£
A.—Salaries and Allowances . . .	(a) 261,648	248,437	13,211	..
B.—Wages, &c., of Men, and hire of Teams	3,223,044	2,682,764	540,280	..
C.—Wages, &c., of Police Force . .	61,391	59,689	1,702	..
D.—Contingencies	3,800	3,700	100	..
Naval Yards Abroad.				
E.—Salaries and Allowances . . .	(a) 109,262	113,335	..	4,073
F.—Wages, &c., of Men, and hire of Teams	408,495	420,885	..	12,390
G.—Wages, &c., of Police Force . .	21,130	21,340	..	210
H.—Contingencies	730	650	80	..
£	4,089,500	3,550,800	555,373	16,673
Deduct,— I.—Appropriations in Aid . . .	26,400	22,000	4,400	..
£	4,063,100	3,528,800	550,973	16,673
		Net Increase	. £534,300	

(*a*) These amounts include the sums of £41,004 for pay of Inspectors of Trades and Senior Draughtsmen at Home and £14,955 for pay of Inspectors of Trades Abroad, which is charged direct to the cost of shipbuilding.

Note.—Provision has been made for New Construction in the above Vote to the extent of—

Section 1	£1,172,150
„ 2	762,460
„ 3	11,341,790
	£13,276,400

The difference (£105,478) between the provision under Section III. of the Vote (£11,341,790) and the amount shown in the Programme (£11,236,312) is due to the estimated withdrawals from Stock of transferable auxiliary machinery, gun mountings and steamboats during the year being less than the cash payments for like articles brought into Stock in the same period.

In addition to the Cash Vote of £5,851,600 under Section II., stocks of Naval Stores purchased in previous years will be drawn upon without replacement during 1913–1914 to the extent of £25,000.

VOTE 8.—SHIPBUILDING, REPAIRS, MAINTENANCE, &c.—*continued.*

II.—SUB-HEADS under which SECTION II., MATÉRIEL, of this VOTE will be accounted for.

	Estimates. 1913-1914.	Estimates. 1912-1913.	Increase.	Decrease.
DOCKYARD WORK—*continued.*				
SECTION II.—MATÉRIEL.				
Naval Stores, &c.	£	£	£	£
A.—Timber, Masts, Deals, &c.	204,900	208,700	..	3,800
B.—Metals and Metal Articles	1,180,900	1,034,800	146,100	..
C.—Coal for Yard purposes	122,000	120,000	2,000	..
D.—Hemp, Canvas, &c.	202,700	208,000	..	5,300
E.—Paint Materials, Oils, Pitch, Tar, Tallow, Boats, Furniture, and other Miscellaneous Articles	687,200	708,000	..	20,800
F.—Electrical, Torpedo, and other Apparatus	655,600	516,000	139,600	..
G.—Freight	50,000	55,000	..	5,000
H.—Rents, Water, &c., Dockyards at Home, and Naval Yards Abroad	41,800	41,000	800	..
I.—Gas and Electric Current, Dockyards at Home and Naval Yards Abroad	12,400	13,100	..	700
£	3,157,500	2,904,600	288,500	35,600
Deduct,—				
J.—Appropriations in Aid.	550,400	339,300	211,100	..
£	2,607,100	2,565,300	77,400	35,600
Fuel, &c., for the Fleet.				
K. I.—Fuel, Lubricating Oils, &c., for the Fleet	2,610,500	2,168,500	442,000	..
K. II.—New Craft and Machinery for Coaling, &c.	444,000	136,000	308,000	..
K. III.—Salaries, Wages, and Allowances	141,000	139,000	2,000	..
K. IV.—Maintenance of Craft for Coaling, &c., and incidental expenses	109,000	109,000	..	..
£	3,304,500	2,552,500	752,000	..
Deduct,—				
L.—Appropriations in Aid.	60,000	41,000	19,000	..
£	3,244,500	2,511,500	733,000	.
£	5,851,600	5,076,800	810,400	35,600
	Net Increase .		£774,800	

VOTE 8.—SHIPBUILDING, REPAIRS, MAINTENANCE, &c.—*continued.*

II.—SUB-HEADS under which SECTION III., CONTRACT WORK, of this VOTE will be accounted for.

———	ESTIMATES. 1913-1914.	1912-1913.	Increase.	Decrease.
SECTION III.—CONTRACT WORK.	£	£	£	£
A.—Propelling, &c., Machinery for His Majesty's Ships, Vessels, &c.	3,759,362	4,332,308	..	572,946
B.—Auxiliary Machinery, &c., for His Majesty's Ships, Vessels, &c.	183,146	105,000	78,146	..
C.—Hulls of Ships, &c., Building by Contract	3,547,117	3,707,057	..	159,940
D.—Armour for His Majesty's Ships and Vessels	2,031,861	2,576,152	..	544,291
E.—Repairs and Alterations by Contract of Ships, &c., and their Machinery and Stores	110,000	100,000	10,000	..
F.—Inspection of Contract Work	146,000	124,000	22,000	..
G.—Gun Mountings and Air-Compressing Machinery	2,105,004	2,384,383	..	279,379
H.—Machinery, &c., for His Majesty's Shore Establishments at Home and Abroad	277,300	337,000	..	59,700
H.H.—Fixed Machinery, formerly provided for by Advances under the Naval Works Acts, 1895 to 1905	5,000	8,000	..	3,000
I.—Royal Reserve of Merchant Cruisers	151,000	150,000	1,000	..
K.—Purchase of Ships, Vessels, &c.	18,000	17,700	300	..
£	12,333,790	13,841,600	111,446	1,619,256
Deduct,— L.—Appropriations in Aid	107,490	175,000	..	67,510
£	12,226,300	13,666,600	111,446	1,551,746
	Net Decrease		£1,440,300	

VOTE 9.

NAVAL ARMAMENTS.

I.—ESTIMATE of the SUM which will be required in the Year ending 31st March, 1914, to defray the Expense of NAVAL ARMAMENTS.

Four Million Three Hundred and Ninety-Six Thousand Pounds.
(£4,396,000.)

II.—SUB-HEADS under which this Vote will be accounted for.

	Estimates. 1913–1914.	Estimates. 1912–1913.	Increase.	Decrease.
NAVAL ORDNANCE, &c., ESTABLISHMENTS AT HOME AND ABROAD	£	£	£	£
A.—Salaries and Allowances	60,020	57,836	2,184	..
B.—Wages of Artificers, &c.	352,480	351,700	780	..
C.—Wages of Crews of Naval Ordnance Vessels	13,000	12,700	300	..
D.—Wages, &c., of Police Force	37,430	33,200	4,230	..
E.—Medical Attendance, Rents, Water, Gas, &c., and Contingencies	17,020	16,394	626	..
NAVAL ORDNANCE STORES.				
F.—Guns	1,224,000	1,135,500	88,500	..
G.—Projectiles and Ammunition	1,638,160	1,560,500	77,660	..
H.—Torpedoes and Gun-cotton	324,900	351,500	..	26,600
I.—Small Arms, Torpedo Materials, Maintenance of Vessels, and Miscellaneous	538,590	455,370	83,220	..
K.—Inspection, Proof, Experiments, &c.	286,000	265,000	21,000	..
L.—Freight and Incidental Charges	30,000	25,000	5,000	..
£	4,521,600	4,264,700	283,500	26,600
Deduct.— M.—Appropriations in Aid	125,600	145,700	..	20,100
£	4,396,000	4,119,000	283,500	6,500
Net Increase			£277,000	

PROGRAMME of the ESTIMATED EXPENDITURE in CASH, and in NET MAINTENANCE, &c., in (Exclusive of the FLEET

SUB-HEADS under which this ESTIMATED EXPENDITURE will be provisions of Section 1 (2), ARMY

	ESTIMATED EXPENDITURE IN				
	Direct Expenditure.				
	Dockyard Work.		Contract Work, Sec. III.	Total Direct Expenditure. (A)	
	Personnel, Sec. I.	Matériel, Sec. II.			
NEW CONSTRUCTION:	£	£	£	£	
A.—DOCKYARD-BUILT SHIPS—					
Hulls, &c. (c)	924,855	561,175	(f) 1,511,912	2,997,942	1
Machinery	60,235	20,015	1,037,498	1,117,748	2
	985,090	581,190	2,549,410	4,115,690	3
B.—CONTRACT-BUILT SHIPS—					
Hulls, &c. (c)	184,210	163,470	(g) 5,719,424	6,067,104	4
Machinery	..	Cr. *4,500*	2,683,630	2,679,130	5
	184,210	158,970	8,403,054	8,746,234	6
C.—OTHER VESSELS, &c. (d)	2,850	22,300	283,848	308,998	7
TOTAL NEW CONSTRUCTION	1,172,150	762,460	11,236,312	(e) 13,170,922	8
D.—REPAIRS, ALTERATIONS, &c.	1,789,331	849,000	479,484	3,117,815	9
E.—STORES, FOR MAINTENANCE, &c.	..	1,152,500	..	1,152,500	10
F.—ESTABLISHMENT, INCIDENTAL, AND MISCELLANEOUS CHARGES, UNAPPROPRIATED	..	..	..	..	11
TOTAL £	2,961,481	2,763,960	11,715,796	17,441,237	12

(c) Including Hydraulic and Transferable Gun Mountings, &c.
(d) Including Harbour Craft, and excluding Torpedo Boats, &c., the value of which is included under other Sub-Heads.
(e) Exclusive of £40,000 provided under Vote 9 for New Vessels for Naval Ordnance Store Service and £122,300 for Coaling Craft, Vote 8, Section 2, Sub-Head K.
(f) Including £749,270 for Armour. (g) Including £1,272,591 for Armour.

VALUES OF STORES issued for SHIPBUILDING, REPAIRS, ALTERATIONS, the Year 1913–1914.
COALING SERVICE.)
accounted for in the NAVY EXPENSE ACCOUNTS, under the AND NAVY AUDIT ACT, 1889.

	1913-1914.		EXPENDITURE AS ESTIMATED IN NAVY ESTIMATES, 1912-1913.			Difference between Direct Expenditure, 1912-1913 (B) and 1913-1914 (A).	
	Establishment, &c., Charges, apportioned.	Aggregate, 1913-1914.	Direct Expenditure. (B)	Establishment, &c., Charges, apportioned.	Aggregate, 1912-1913.	Increase.	Decrease.
	£	£	£	£	£	£	£
1	246,149	3,244,091	(h) 3,389,472	258,010	3,647,482	..	391,530
2	29,011	1,146,759	839,924	29,868	869,792	277,824	..
3	**275,160**	**4,390,850**	**4,229,396**	**287,878**	**4,517,274**	..	**113,706**
4	134,853	6,201,957	(i) 6,137,675	116,036	6,253,711	..	70,571
5	42,413	2,721,543	3,155,495	53,448	3,208,943	..	476,365
6	**177,266**	**8,923,500**	**9,293,170**	**169,484**	**9,462,654**	..	**546,936**
7	7,085	316,083	305,982	5,388	311,370	3,016	..
8	**459,511**	**13,630,433**	**13,828,548**	**462,750**	**14,291,298**	..	**657,626**
9	369,504	3,487,319	2,480,693	325,462	2,806,155	637,122	..
10	110,955	1,263,455	1,027,500	94,678	1,122,178	125,000	..
	939,970			882,890			
11	2,680,962	2,680,962	..	3,026,641	3,026,641	..	..
12	**3,620,932**	**21,062,169**	**17,336,741**	**3,909,531**	**21,246,272**	..	..

NET INCREASE ON DIRECT EXPENDITURE . . £104,496

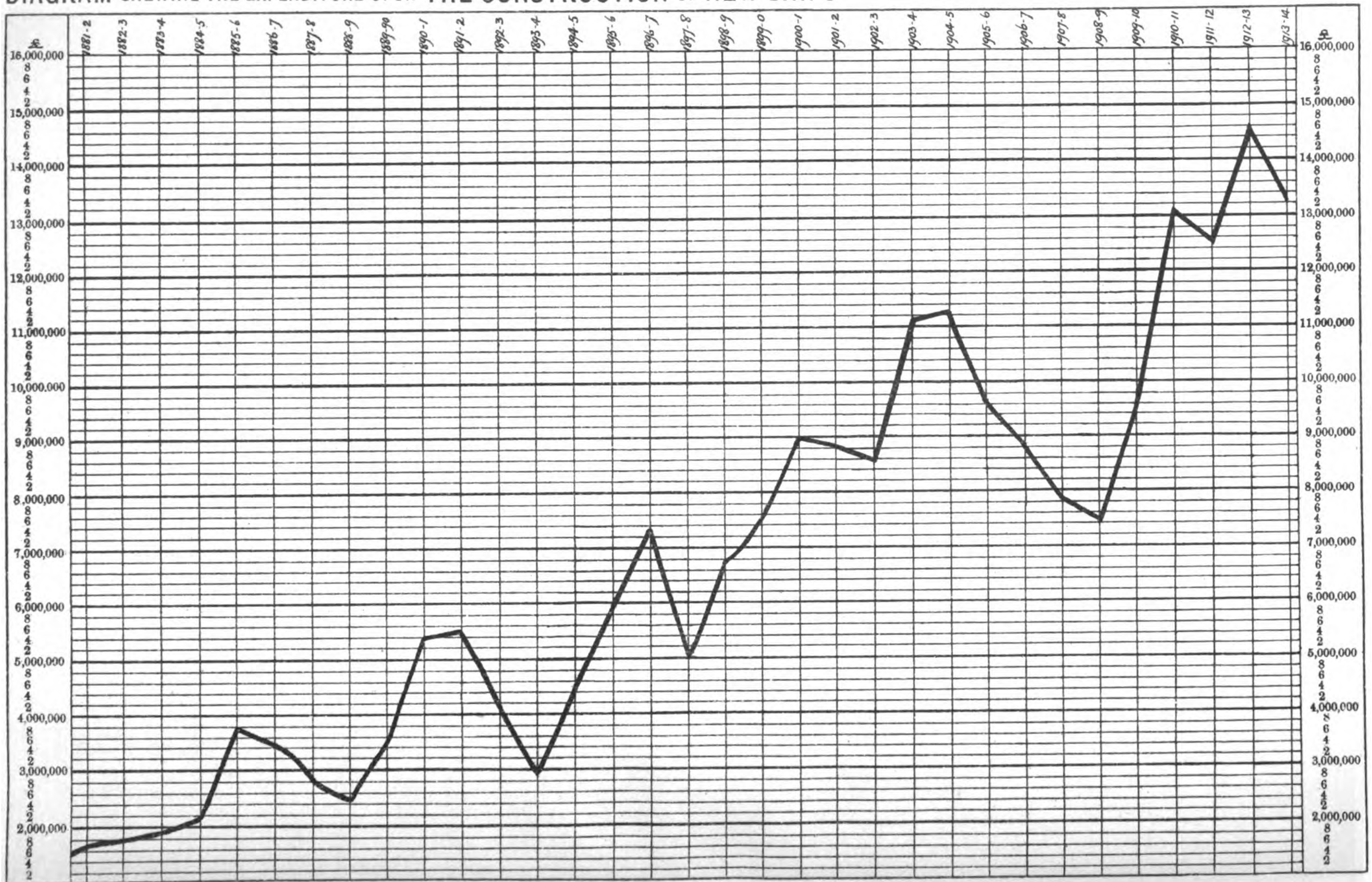
(h) Including £1,077,733 for Armour.
(i) Including £1,488,116 for Armour.

LIST of New Ships and Vessels Estimated to be Passed into Commission during the Years 1913–1914 and 1912–1913.

1913–1914.				1912–1913.			
Name of Ship.	Load Displacement in Tons.	Estimated Horse Power.	Number of Guns.	Name of Ship.	Load Displacement in Tons.	Estimated Horse Power.	Number of Guns.
BATTLESHIPS.				**BATTLESHIPS.**			
Iron Duke . . .	..	..	..	King George V. .	23,000 (e)	31,000	10
Marlborough .	..	..	..	Centurion . .	23,000 (e)	31,000	10
Ajax	23,000 (e)	31,000	10	Thunderer .	22,500 (e)	27,000	10
Audacious . . .	23,000 (e)	31,000	10	Conqueror . . .	22,500 (e)	27,000	10
BATTLE-CRUISERS.				**BATTLE-CRUISERS.**			
Queen Mary. . .	27,000 (e)	75,000	8	Lion	26,350 (e)	70,000	8
				Princess Royal . .	26,350 (e)	70,000	8
LIGHT CRUISERS.				**LIGHT CRUISERS.**			
Lowestoft . . .	5,440	25,000	9	Chatham . . .	5,400	25,000	8
Nottingham . .	5,440	25,000	9	Dublin	5,400	25,000	8
Birmingham . .	5,440	25,000	9	Southampton . .	5,400	25,000	8
Fearless	3,440	18,000	10	Amphion . . .	3,440	18,000	10
TORPEDO CRAFT.				**TORPEDO CRAFT.**			
Torpedo Boat Destroyers . 35	..	Various	..	Torpedo Boat Destroyers . 15	..	Various	..
Submarine Boats 11	.	..	..	Submarine Boats 3	..	..	..
MISCELLANEOUS.				**MISCELLANEOUS.**			
Woolwich . . .	3,380	2,600	4	Maidstone . .	3,600	2,800	..
Mediator. . . .	..	.	..	Endeavour . . .	1,280	1,100	..
Dépôt Ship for Torpedo Boat Destroyers . .	..	..	..	Adamant . . .	935	1,400	..
				Alecto	935	1,400	..

(e) Estimated.

DIAGRAM SHEWING THE EXPENDITURE UPON THE CONSTRUCTION OF NEW SHIPS DURING THE 33 YEARS BETWEEN 1881-82 & 1913-14.



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RECAPITULATION OF ESTIMATED EXPENDITURE ON SHIPBUILDING.

SUB-HEADS OF EXPENDITURE.	Charged Direct as Incurred.	Establishment, etc., Charges Apportioned.	New Construction.	Repairs, Alterations, etc.			Stores for Maintenance, etc.	Establishment and Incidental Charges Unapportioned to Ships, etc.		Total Amount of Estimated Expenditure.
				Ships. Large Repairs and Alterations.	Ships. Other Repairs, etc.	Other Naval Services.				
DOCKYARD WORK:	£	£	£	£	£	£	£	£	£	£
Section I.—*Personnel* .	2,961,481	1,346,847	1,336,354	507,221	1,424,478	75,265	67,947	417,207	479,856	4,308,328
Section II.—*Matériel* .	2,763,960	1,648,011	881,652	282,345	651,328	61,239	1,195,508	576,789	974,795	4,411,971
CONTRACT WORK:										
Section III. . .	11,715,796	626,074	11,412,427	147,117	217,265	121,061	..	15,150	217,165	12,341,870
Total Estimated Expenditure for 1913–1914	17,441,237	3,620,932	13,630,433	936,683	2,293,071	257,565	1,263,455	1,009,146	1,671,816	21,062,169
Totals of Sub-Heads £	**21,062,169**		**13,630,433**	**3,487,319**			**1,263,455**	**2,680,962**		**21,062,169**

Austro-Hungarian Navy Estimates, 1913-14.

(Converted at £1 = 24 Kronen.)

Heads of Expenditure.	Estimates, 1913–14.	Estimates, 1912–13.
ORDINARY ESTIMATES.	£	£
Pay of Officers, etc.	278,100	260,290
Pay and Clothing—petty officers and seamen	320,445	245,484
Land Service	160,300	135,142
Sea Service	433,004	390,362
Shore Establishments	40,590	38,926
Maintenance of Fleet	771,542	519,125
New Construction, viz.:—		
(A) Hulls and Machinery: Battleship Zrinyi, 14,500 tons	—	200,000
Cruiser Admiral Spaun, 3500 tons	—	70,833
Mine-ship, 1000 tons, 2nd instalment	31,667	29,166
Aeroplanes	—	4,166
2 Steam Colliers (carrying 7000 tons), 1st instalment	166,667	—
9 Torpedo-boats, 250 tons, 1st instalment	192,972	—
(B) Guns, torpedo-fittings, &c., for above vessels	39,167	529,166
Guns and Small Arms	240,167	160,875
Miscellaneous	247,370	226,634
	2,921,991	2,840,169
Less Special Receipts	20,833	18,750
Total of Ordinary Estimates	2,901,158	2,821,419
EXTRAORDINARY ESTIMATES.		
Pay and Clothing, &c.	8,333	4,166
Shore Establishments	1,250	250
Floating-Dock for torpedo-boats and destroyers	27,083	—
Large Alterations	30,417	57,500
Guns and Small Arms, Torpedo Fittings, &c.	30,000	29,636
Buildings	92,742	73,844
Miscellaneous	3,066	3,066
	3,094,019	2,989,871
Extraordinary credits for further Development of the Fleet, including guns, torpedoes, &c.	2,850,000	2,791,666
Ditto ditto for defensive works at Pola	41,666	41,666
Total	£5,985,715	£5,823,203

Subsequently to the sanctioning of the above an additional credit of 40,000,000 kronen (£1,670,000) was opened, providing for the building of two monitors, additional torpedo-boats, and a large floating-dock. The Estimates for 1914-15 presented to the Delegations in March, 1913, amount in round figures to £8,300,000 on all accounts, except for the mobilisation caused by the war in the Balkan peninsula, and include grants for three battleships to replace the Monarch class.

French Navy Estimates, 1913.

(Converted at £1 = 25 francs.)

Cap. in Estimates, 1913.	Heads of Expenditure.	Credits voted for 1913.	Credits voted for 1912.
	SECTION I.		
	General Expenses of Administration—Maintenance of the Navy.	£	£
1, 2, 3, 4	Admiralty Office	192,110	182,064
5, 6	Hydrographic Department . . .	29,435	29,288
7	Inspection of Administrative Services .	12,949	12,780
8, 9, 10, 11	Navy Pay, Officers and Men; Mess Allowance, Officers	2,791,333	2,657,712
12, 13	Justice and Police	105,285	101,725
14	Commissariat Staff.	55,663	54,321
15, 16, 17	Storekeeper's Department — Wages and Materials	1,115,108	1,004,145
18, 19	Victualling Department — Wages and Materials	985,173	907,155
20, 21, 22	Medical and Hospitals	213,255	199,949
23	Constructors' Staff.	215,925	210,253
24, 26	Shipbuilding—Maintenance and repair of Fleet; Wages	613,208	562,120
25, 27	Shipbuilding—Maintenance and repair of Fleet; Materials	816,680	783,387
28	Ordnance Staff	85,105	80,340
29, 31	Guns—Repairs and improvements, &c.; Wages	184,541	175,664
30, 32	Guns—Repairs and improvements, &c.; Materials	862,019	672,767
33, 34, 35	Hydraulic and other Works . . .	163,965	161,152
36	Administrative Staff	185,808	185,035
37	Travelling and lodging allowances . .	145,198	148,909
38	Charitable and subscriptions . . .	108,405	107,298
39	Pay of Reserve Officers	40,220	38,944
40	Secret Service	4,000	4,000
	SECTION II.		
41–45	Mercantile Marine and Fisheries . .	140,180	132,944
46	Pensions	704,121	662,132
	Carried forward . .	£9,769,689	£9,074,084

FRENCH NAVY ESTIMATES—*continued.*

Cap. in Estimates, 1913.	Heads of Expenditure.	Credits voted for 1913.	Credits voted for 1912.
		£	£
	Brought forward .	9,769,689	9,074,084
	SECTION III. *New Construction, Guns, Works.*		
47	Sundry Stores	376,080	347,297
48	Shipbuilding in Dockyards—Wages .	588,200	426,800
49	,, ,, Materials .	2,401,760	1,447,529
50	,, by Contract . .	1,587,080	2,319,440
51	Torpedoes and Mines	340,000	340,000
52	Machinery, large tools, and workshops	481,884	449,360
53	New guns and renewals—Wages . .	109,742	111,816
54	,, ,, Materials . .	2,160,604	1,582,987
55	,, machinery, tools, and workshops	176,000	127,960
56–58	New Works, including defence of military ports and bases of operations . .	488,764	703,876
59	Aviation	20,032	—
59 bis	Repayment of advances account programme authorised by law of March 30, 1912 .	123,920	—
		£18,626,755	£16,931,149

PROGRAMME OF NEW CONSTRUCTION, TO BE CONTINUED OR UNDERTAKEN IN 1913.—BUILDING IN DOCKYARDS.

Class.	Names of Ships.	Where Building.	Date of Commencement.	Proposed Date of Completion.	Estimated Cost.	Probable Expenditure in 1913.
					£	£
Battleships	Jean Bart	Brest	1910	1913	2,532,935	406,382
	Courbet	Lorient	1910	1913	2,508,388	382,568
	Bretagne	Brest	1912	..	2,589,439	1,099,900
	Provence	Lorient	..	..	2,600,195	1,101,994
	A 9 (Flandre)	Brest	..	..	2,589,439	27,500
	A 10 (Gascogne)	Lorient	..	..	2,589,439	27,350
Torpedo-boat Destroyers	Bisson	Toulon	1911	1913	267,142	44,812
	Renaudin	"	1911	1913		
	Protet	Rochefort	1911	1914	130,027	35,324
	Commandant Lucas	Toulon	1911	1914	133,345	43,704
	2 t.b.d. (800 tons)	Rochefort	..	..	258,526	50,731
27 Submarines	Bernouilli	Toulon	1908-9	1912-13	439,785	4,763
	Joule	"	1908-9	1912-13		
	Coulomb	"	1908-9	1912-13		
	Arago	"	1908-9	1912-13		
	Curie	"	1908-9	1912-13		
	Le Verrier	"	1908-9	1912-13		
	Foucault	Cherbourg	1910	1912-13	229,732	3,336
	Euler	"	1910	1912-13		
	Franklin	"	1910	1912-13		
	Mariotte	"	1908	1912	117,974	2,600
	Amiral Bourgois	Rochefort	1908	1913	119,689	2,400
	Clorinde	"	1911	1913	151,446	6,622
	Cornélie	"	1911	1913		
	Gustave Zédé	Cherbourg	1912	1913-15	320,533	94,056
	Néréide	"	1912	1913-15		
	Q 94 and Q 95	Rochefort	1912	1914	157,870	100,129
	Q 96 to Q 99	Toulon	1912-13	1913-14	354,711	196,400
	Q 100 and Q 101	Cherbourg	1913	1914	161,934	100,464
	Q 102	Rochefort	1913	1914	97,421	65,503
	1 of 800 tons	Cherbourg	..	..	174,541	57,666
	2 of 800 tons	Toulon	..	..	341,402	81,962
	Total building in Dockyards	..	..	£	18,855,913	3,936,166

Programme of New Construction, to be continued or undertaken in 1913.—Building by Contract.

Class.	Names of Ships.	Where Building and to be Completed.	Date of Commencement.	Proposed Date of Completion.	Estimated Cost.	Probable Expenditure in 1913.
					£	£
Battleships	France	St. Nazaire—Brest	1911	1914	2,550,207	890,255
	Paris	La Seyne	1911	1914	2,554,207	890,255
	Lorraine	St. Nazaire	1912	—	2,642,439	899,587
	A 7 (Languedoc)	La Seyne	1913	—	2,642,439	344,980
	A 8 (Normandie)	St. Nazaire	1913	—	2,642,439	344,980
Torpedo-boat Destroyers	Capitaine Mehl	St. Nazaire—Lorient	1910	1912	124,713	23,056
	Dehorter	Cherbourg	1910	1912	125,147	21,586
	Francis Garnier	"	1910	1912	127,675	9,130
	Commandant Rivière	Lorient	1910	1912	120,248	7,816
	Commandant Bory	"	1910	1912	120,760	22,216
	Magon	"	1912	1913	124,103	45,618
	Mangini	Toulon	1911	1913	123,414	46,657
	1 t.b.d., 800 tons	—	1911	—	126,615	33,281
Mine-layers	Pluton	Cherbourg	1910	1912	73,224	3,800
	Cerbère	"	1911	1912	59,904	16,022
River Gunboat	Balny	Cherbourg	1913	—	24,853	17,004
Transport	Seine	Toulon	1912	1913	55,264	34,064
Despatch-boat	To replace Ibis	—	1913	—	20,805	8,537
	Total building by Contract				£14,258,456	3,658,844

German Navy Estimates, 1913.

(Converted at £1 = 20·43 marks.)

Ordinary Permanent Estimates.

Heads of Expenditure.	Estimates for the financial year 1913.	Granted for the financial year 1912.
	£	£
Imperial Navy Office	120,319	115,960
Admiral Staff	17,792	17,521
Look-out Stations and Observatories	22,457	21,240
Station Superintendencies	45,742	43,841
Administration of Justice	11,380	10,727
Naval Chaplains and Garrison Schools	10,884	10,285
Navy Pay	2,333,213	2,037,400
Maintenance of Ships in Commission	2,792,560	2,472,396
Victualling	176,540	157,162
Clothing	29,145	28,503
Garrison Works and Administration	72,578	70,083
" Building Materials	49,554	46,730
Lodging Allowance	219,514	207,709
Medical Department	181,525	164,040
Travelling Expenses, Freight Charges, &c.	210,620	207,866
Training Establishments	35,956	30,637
Maintenance of Fleet and Docks	1,872,460	1,810,310
Ordnance and Fortification	1,196,063	1,038,550
Accountants' Department	67,625	60,995
Pilotage, Coastguard, and Surveying Service	48,928	44,681
Miscellaneous Expenses	130,360	104,391
Administration of Kiau-chau Protectorate	7,708	7,619
Total of Ordinary Permanent Estimates carried to Summary, next page	9,652,923	8,708,646

German Navy Estimates—*continued.*

Special Ordinary Estimates.

Shipbuilding Programme for the Financial Year 1913.

For the Construction of—		£
Battleship Kaiserin (Ersatz Hagen)	final instalment	244,738
„ König Albert (Ersatz Ægir)	„ „	244,738
„ Prinzregent Luitpold (Ersatz Odin)	„ „	244,738
Large cruiser Seydlitz (J)	„ „	252,079
Battleship Ersatz Kurfürst Friedrich Wilhelm	3rd instalment	440,529
„ Ersatz Weissenburg	„ „	440,529
„ S	„ „	440,529
Large cruiser K	„ „	416,055
Small cruiser Karlsruhe (Ersatz Seeadler)	final instalment	73,420
„ Rostock (Ersatz Geier)	„ „	73,420
Battleship, Ersatz Brandenburg	2nd instalment	513,954
Large cruiser, Ersatz Kaiserin Augusta	„ „	538,420
Small cruiser Ersatz Irene	„ „	122,370
„ Ersatz Prinzess Wilhelm	„ „	122,370
Battleship Ersatz Wörth	1st instalment	342,633
„ T	„ „	342,633
Large cruiser, Ersatz Hertha	„ „	244,738
Small cruiser, Ersatz Gefion	„ „	122,370
„ Ersatz Hela	„ „	122,370
Gunboat C	„ „	44,052
Imperial Yacht Ersatz Hohenzollern	„ „	244,738
Despatch Vessel	full amount	29,368
Torpedo-boat division	final instalment	391,585
„ „	1st instalment	489,475
Submarines, construction and experiments		978,952
Alteration and improvement of large cruisers		39,158
„ „ small „		34,263
Total		£7,594,224

Summary.

Heads of Expenditure.	Estimates for the financial year 1913.	Granted for the financial year 1912.
	£	£
Ordinary Permanent Estimates	9,652,923	8,708,646
New Construction and Alterations	7,594,224	8,151,248
Armaments, Torpedoes, and Mines	3,582,183	3,832,110
*Other items	2,058,540	1,772,682
Total £	22,887,870	22,464,686

* Including improvement of docks at Wilhelmshaven, Kiel, and Danzig, coast fortifications and other buildings on North Sea and Baltic coasts, harbour for small vessels at Heligoland, &c.

Italian Navy Estimates, 1913-14.

Financial Year 1st July, 1913, to 30th June, 1914.

(Converted at £1 = 25 lire.)

Heads of Expenditure.	Estimates, 1913-1914.	Revised Estimates, 1912-1913.
Ordinary General Expenditure.	£	£
Admiralty	90,060	87,240
Pensions	427,300	396,900
Expenditure on the Mercantile Marine for subsidies, &c.	1,105,844	934,096
Lighthouses, signal stations, &c.	64,404	56,720
Total . . £	1,687,608	1,474,956
Ordinary Expenditure for Naval Services.	£	£
General Staff of the Navy	176,000	175,600
Corps of Engineers	77,200	77,200
Medical Service	35,600	35,600
Commissariat Service	38,400	38,400
Pay of Officers, and Wages and Clothing of Men	824,928	744,920
Gratuities, &c.	217,000	208,000
Forts—*Personnel*	24,000	18,480
Telegraph Service—*Personnel*	18,000	16,000
„ „ *Matériel*	7,360	5,360
Police (Dockyards)	19,984	13,600
Salaries and Travelling Expenses	50,520	48,400
Barracks, Maintenance, Lighting, etc.	10,800	10,400
Rents and Water Royalties	3,320	3,000
Ships fitting out, &c.	462,668	380,000
Fuel and Stores for Ships in Commission	409,000	363,000
Victualling	584,000	504,000
Hospital Services	35,200	31,800
Naval College and Engineering School	20,280	13,640
Scientific Services—*Personnel*	7,680	7,600
„ „ *Matériel*	7,672	6,880
Wireless Telegraph Stations, Benadir and Eritrea, and School of Telegraphy, Rome	16,000	14,000
Air Department—*Personnel* and *Matériel*	16,000	—
Workshops, Fortifications, and Stores—*Personnel*	74,200	74,400
Technical Department (Civil)—*Personnel*	39,960	39,520
Naval Constructors	32,560	32,600
Office Expenses and Civil Staff	9,116	8,900
Law Charges	1,344	1,344
Transport of Materials	9,600	9,600
Works Department—Repairs	95,440	95,800
Plant, Machinery and Tools; Reconstruction and maintenance of Workshops	74,200	70,000
Electric Power, Fuel and Stores for Shore Establishments	88,000	81,600
Materials for construction of new Ships and maintenance of existing Ships—Hulls, Machinery, and Armaments	2,800,000	2,400,000
Wages and Expenses of Dockyard employés	800,224	780,800
Guns, Torpedoes and Small Arms	150,800	130,800
Coast Defence—*Matériel*	12,000	12,000
Reserve Fund	20,000	20,000
Total (to next page) . £	7,269,056	6,473,244

ITALIAN NAVY ESTIMATES—*continued.*

Heads of Expenditure.	Estimates, 1913–1914.	Revised Estimates, 1912–1913.
EXTRAORDINARY EXPENDITURE.	£	£
Temporary Civil Staff	3,440	4,800
General Expenses and Half Pay	4,400	3,800
Total . . . £	7,840	8,600

SUMMARY.

	£	£
Ordinary General Expenditure	1,687,608	1,474,956
„ Expenditure for Naval Services	7,269,056	6,473,244
Extraordinary Expenditure	7,840	8,600
Rent of Lands occupied by Government	111,618	108,940
Lighthouses and Buoys	16,000	32,400
Supplementary Fund, for Shipbuilding	777,343	377,307
Purposes other than Shipbuilding	400,000	200,000
Grand Total . . £	10,269,460	8,675,447

Japanese Navy Estimates, 1913–1914.

Financial Year, 1st April to 31st March.

(9·8 Yen taken as equal to £1.)

ORDINARY EXPENDITURE.	Estimates, 1913–1914.	Voted, 1912–1913.
Vote.	£	£
1. Admiralty	19,824	19,824
2. Pay and Allowances	1,309,034	1,289,633
3. Offices	44,134	44,134
4. Repairs to Buildings	26,390	26,390
5. Travelling Expenses	66,999	66,297
6. Miscellaneous Expenses	33,489	33,489
7. Allowances to Cadets and Petty Officers for Clothing	34,008	33,616
8. Clothing and Provisions	711,901	695,374
9. Shipbuilding, Armaments, and Repairs	1,243,556	1,173,524
10. Manœuvres	31,496	30,020
11. Hospital Expenses	25,426	24,738
12. Naval Harbours	37,893	37,893
13. Maintenance of Ships and Dockyards	662,769	627,776
14. Family Allowances to Petty Officers and Men	32,876	32,876
15. Prisoners	714	714
16. Hydrographic Service	16,471	16,471
17. Salaries to Foreigners	2,086	2,086
18. Secret Service	8,167	8,167
19. Maintenance	2,042	2,042
20. Law Costs, Compensation Claims, Bonuses, etc.	2,339	1,540
	£4,311,614	£4,166,604
EXTRAORDINARY EXPENDITURE.		
Vote.	£	£
1. New Works and Repairs	21,946	40,132
2. Chinkai Naval Station (4th instalment)	71,458	71,458
3. Repairs in Naval Dockyards to Ships not belonging to Navy	21,671	21,671
4. Works Department	5,089	5,089
5. Production of Charts	1,531	1,531
6. Armaments Replenishing Fund	5,386,768	5,086,014
7. Magazine Cooling Arrangements	30,625	30,625
8. Investigation of Aeronautics	10,210	10,210
— Renewing guns, etc., at educational establishments	..	19,269
— Battle Practice Targets	..	7,172
— Entertaining Foreign guests at Grand Manœuvres	..	2,042
— Expenditure connected with Chinese revolution	..	72,180
	£5,549,298	£5,367,393
SUMMARY.	£	£
Ordinary Expenditure	4,311,614	4,166,604
Extraordinary Expenditure	5,549,298	5,367,393
Total	£9,860,912	£9,533,997

Russian Navy Estimates, 1913.

FINANCIAL YEAR, JANUARY TO DECEMBER.

(9·412 roubles taken as equal to £1.)

Heads of Expenditure.	Proposed, 1913.	Voted, 1912.
	£	£
Administration	348,380	333,164
Pay, Clothing, Harbour Victualling, etc.	1,517,017	1,356,590
Sea Pay, Sea Victualling, Fuel, Stores, etc.	2,206,744	1,927,302
Hydrographic, Lighthouse, Lifeboat, and Pilot Services	545,594	541,803
Shipbuilding	10,953,616	7,940,094
Armaments	5,041,820	3,244,705
Naval Ports and Establishments	3,065,333	1,676,727
Medical Service	169,682	154,598
Educational Services	156,731	129,891
Martial Law	20,503	20,276
Pensions, etc.	149,849	146,594
Amur River Flotilla	233,101	127,314
Miscellaneous	69,117	82,149
Total	£24,477,487	17,681,207

United States Navy Estimates, 1913-14.

(Converted at £1 = $4·8665, being par, as adopted by Congress.)

Objects of Expenditure and Appropriation.	Estimates for year ending June 30, 1914.	Appropriated for year ending June 30, 1913.
	£	£
Pay of the Navy	8,068,356	7,661,618
Pay, Miscellaneous	205,486	205,486
Contingent, Navy	9,452	9,452
Naval Station (for Lepers), Island of Guam	2,876	2,876
Bureau of Navigation	649,516	639,415
" Ordnance	2,660,946	2,672,865
" Equipment	2,328,161	1,838,753
" Yards and Docks	334,942	314,393
Public Works under Bureau of Yards and Docks		
Public Works under Secretary of Navy (Naval Academy)		
Public Works under Bureau of Navigation (Training Stations and War College)	1,341,095	950,024
Public Works, Bureau of Ordnance		
" " " Equipment		
" " " Medicine and Surgery		
" " Marine Corps		
Bureau of Medicine and Surgery	137,470	111,372
" Supplies and Accounts	1,955,909	1,888,897
" Construction and Repair	1,889,270	1,783,445
" Steam Engineering	1,303,194	1,355,388
Naval Academy	122,315	119,309
Marine Corps	1,655,558	1,525,937
Increase of Navy:—		
Construction and Machinery	3,986,586	2,023,261
Torpedo-boats and Submarines	422,969	518,163
Colliers	—	119,453
Armour and Armament	3,976,692	1,492,899
Equipment	72,947	72,947
Total £	*31,123,740	£25,305,953

* The amount actually appropriated by Congress for 1913–14 was £28,932,630. Under the head of Increase of Navy the number of battleships proposed was reduced from three to one.

GERMAN NAVAL LAW AMENDMENT ACT.

AN official translation of the Bill which received the sanction of the Reichstag was published in 1912 as a Parliamentary Paper (Cd. 6117). The provisions of the new enactment, so far as they affect the increase of the Fleet, are best seen from the Appendix given below. The following is the Argument:—

The organisation of the Fleet still suffers from two serious defects.

The one defect consists in the fact that in the autumn of every year the time-expired men, *i.e.*, almost one-third of the crew in all ships of the Battle Fleet, are discharged and replaced mainly by recruits from the inland population. Owing to this, the readiness of the Battle Fleet for war is considerably impaired for a prolonged period.

The second defect consists in the fact that at the present time, with an establishment of fifty-eight capital ships, only twenty-one capital ships are available at first, if the Reserve Fleet cannot be made ready in proper time. Since the Fleet Law was drawn up, this latter has become more and more unlikely, as the moment at which the Reserve Fleet can be ready for war gets more and more deferred. This is a consequence of the ever-growing complexity of modern ships and of the steadily growing difficulty in training large organisations. At the present day, therefore, the Reserve Fleet only comes into consideration as a second fighting line; but in view of our great numerical strength in reserve men, it still maintains its great importance.

Both these defects are to be removed, or at any rate considerably ameliorated, by the gradual formation of a Third Active Squadron.

The requisite ships for this Third Active Squadron are to be derived:—

(*a*) By dispensing with the Reserve Fleet Flagship.

(*b*) By dispensing with the present existing Material Reserve —four battleships, four large and four small cruisers.

(*c*) By newly constructing three battleships and two small cruisers.*

As the maintenance in commission of ships in the Reserve Fleet can be reduced by one-half, in consequence of the increase of active organisations, the formation of a Third Active Squadron only renders

* Establishments increased respectively from thirty-eight to forty-one, and from thirty-eight to forty.

the additional maintenance in commission of three battleships, three large and three small cruisers, necessary beyond those to be maintained in commission already provided for in the Fleet Law. This involves a corresponding increase in *personnel.*

A further increase in *personnel* is necessary as the complements of all classes of ships, including torpedo-boats, have to be augmented.

Moreover, an increase in submarines and the acquisition of some airships is contemplated. The submarines, which are still at the present moment without organisation, are to be organised—as regards manning—after the manner of the torpedo-boats.

Comparison of the Amendment with the Fleet Laws, 1900 *and* 1906.

Provisions of the Fleet Law.	Alterations of the Amendment.
I. *Establishment of Ships.*	I. *Establishment of Ships.*
§ 1.	§ 1.
There shall be:—	There shall be:—
1. The Battle Fleet, consisting of— 2 Fleet flagships, 4 squadrons, of 8 battleships each, 8 large cruisers as scouts, 24 small " "	1. The Battle Fleet, consisting of— 1 Fleet flagship, 5 squadrons, of 8 battleships each, 12 large cruisers as scouts, 30 small " "
2. The Foreign Service Fleet, consisting of— 8 large cruisers, 10 small "	2. The Foreign Service Fleet, consing of— 8 small cruisers, 10 small "
3. The Material Reserve, consisting of— 4 battleships, 4 large cruisers, 4 small "	
II. *Maintenance in Commission.*	II. *Maintenance in Commission.*
§ 3.	§ 3.
The following principles obtain regarding the maintenance in commission of the Battle Fleet:—	The following principles obtain regarding the maintenance in commission of the Battle Fleet:—
1. The First and Second Squadrons form the Active Battle Fleet, the Third and Fourth Squadrons the Reserve Battle Fleet.	1. **1 Fleet flagship, 3 squadrons of battleships. 8 large cruisers, and 18 small cruisers, form the Active Battle Fleet. 2 squadrons of battleships, 4 large cruisers, and 12 small cruisers, form the Reserve Battle Fleet.**
2. The whole of the Battleships and cruisers of the Active Fleet, and one-half of those of the Reserve Battle Fleet, are to be kept permanently in commission.	2. The whole of the battleships and cruisers of the Active Battle Fleet and **one-quarter** of those of the Reserve Battle Fleet are to be kept permanently in commission.

III. *Establishment of Personnel.*	III. *Establishment of Personnel.*
§ 4.	§ 4.
The following proportion of Warrant Officers, Petty Officers, and men of the Seamen, Dockyard, and Torpedo Divisions shall be available—	The following proportions of warrant officers, petty officers, and men of the Seamen, Dockyard, and Torpedo Divisions, **as well as of the Submarine Sections,** shall be available—
1. Full crews for the ships belonging to the Active Battle Fleet, for half of the torpedo-boats, for the school ships, and for the special ships.	1. Full crews for the ships belonging to the Active Battle Fleet, **for the whole of the torpedo-boats and submarines with exception of the Material Reserve of both these classes of boats, for the school ships and for the special ships.**
2. Nucleus crews (two-thirds of the engine-room *personnel*, half of the remaining *personnel* of the full crews) for the ships belonging to the Reserve Battle Fleet, as well as for the second half of the torpedo-boats.	2. Nucleus crews **(one-third** of the engine room *personnel*, **one-quarter** of the remaining *personnel* of the full crews) for the ships belonging to the Reserve Battle Fleet.

The remaining provisions of the Fleet Laws remain unaltered.

With regard to § 4.

In accordance with the Memorandum to the Estimates of 1906 there are to be :—

Altogether	144 torpedo-boats.
Of which ready for use . .	99 with full active service crews.
As Material Reserve . . .	45 without crews.

Nothing is altered in this by the Amendment. The Fleet Law of 1900 provided for seventy-two full crews and seventy-two nucleus crews, making together a total of 116 full crews. Only ninety-nine are required, and the Fleet Law, therefore, demands seventeen full crews too many. Article 3 of the *Amendment* brings the number of crews legally to be held in readiness into line with actual requirements, and therefore reduces the torpedo-*personnel* demanded under the Fleet Law by seventeen boats' crews.

It is proposed to demand six submarines every year. With a twelve-years' life, this gives an establishment of seventy-two boats. For fifty-four of these boats active service crews are estimated for; eighteen form the Material Reserve without crews.

CANADIAN NAVAL PROPOSALS.

The following is the text of the Bill submitted by Mr. Borden to give effect to the proposals of the Canadian Government in "An Act to Authorize Measures for Increasing the Effective Naval Forces of the Empire":—

"His Majesty, by and with the advice and consent of the Senate and the House of Commons of Canada, enacts as follows:—

"From and out of the Consolidated Revenue Fund of Canada there may be paid and applied a sum not exceeding $35,000,000 for the purpose of immediately increasing the effective naval forces of the Empire.

"The said sum shall be used and applied under the direction of the Governor in Council in the construction and equipment of battleships or armoured cruisers of the most modern and powerful type.

"The said ships, when constructed and equipped, shall be placed by the Governor in Council at the disposal of His Majesty for the common defence of the Empire. The said sum shall be paid, used, and applied, and the said ships be constructed and placed at the disposal of His Majesty, subject to terms, conditions, and arrangements to be agreed upon between the Governor in Council and His Majesty's Government."

The Naval Policy of the Canadian Government was announced, amid scenes of the utmost enthusiasm, in the Dominion House of Commons on December 5, 1912, and the very important speech of the Prime Minister is well worthy of being recorded here:—

Mr. Borden said: In addressing the House upon so important a subject as that which I propose to discuss, I shall speak in no controversial spirit. If a portion of my remarks may necessarily controvert opinions which have been expressed by gentlemen on either side of the House, let it be understood that I do so, not by way of criticism, but purely for the purpose of giving frankly to the House the reasons which have led the Government to adopt the course which I shall now outline.

It is not necessary to dwell upon the increasing power and influence of Canada within the Empire, due to its remarkable growth and expansion, and to the wonderful and rapid development of its resources during the past quarter of a century. With this increasing

power and influence there has necessarily come, by sure and gradual steps, a certain development in our relations with the United Kingdom and the other Dominions. The evolution of constitutional relations within the Empire during the past half century has not been less marked than its material progress. In this constitutional development we are necessarily confronted with the problem of combining co-operation with autonomy. It seems most essential that there should be such co-operation in defence and in trade as will give to the whole Empire an effective organisation in these matters of vital concern. On the other hand, each Dominion must preserve in all important respects the autonomous government which it now possesses.

The Imperial Burden.

The responsibility for the Empire's defence upon the high seas, in which is to be found the only effective guarantee of its existence, and which hitherto has been assumed by the United Kingdom, has necessarily carried with it the responsibility for and the control of foreign policy. With the enormous increase of naval power which has been undertaken by all the great nations in recent years this tremendous responsibility has cast an almost impossible burden upon the British Islands, which for nearly a thousand years have exercised so profound an influence upon the world's history. That burden is so great that the day has come when either the existence of the Empire will be imperilled or the young and mighty Dominions must join with the Motherland to make secure the common safety and the common heritage of all. When Great Britain no longer assumes sole responsibility for defence upon the high seas she can no longer undertake to assume sole responsibility for and sole control of foreign policy, which is closely, vitally, and constantly associated with that defence in which the Dominions participate.

It has been declared in the past, and even during recent years, that the responsibility for foreign policy could not be shared by Great Britain with the Dominions. In my humble opinion, adherence to such a position could have but one, and that a most disastrous, result. During my recent visit to the British Islands I ventured on many public occasions to propound the principle that the great Dominions, sharing in the defence of the Empire upon the high seas, must necessarily be entitled to share also in the responsibility for and in the control of foreign policy. No declaration I made was greeted more heartily and enthusiastically than this. It is satisfactory to know to-day that not only His Majesty's Ministers but also the leaders of the opposite political party in Great Britain have

explicitly accepted this principle, and have affirmed the conviction that the means by which it can be constitutionally accomplished must be sought, discovered, and utilised without delay.

The Duty of Canada.

Before proceeding to declare and explain the proposals of the Government, I desire to call attention to certain remarks which I addressed to the House just two years ago in replying to inquiries as to the course we should pursue after attaining power. These remarks were as follows:

> It may be fairly asked what we would do if we were in power to-day with regard to a great question of this kind. It seems to me our plain course and duty would be this. The Government of this country are able to ascertain and to know, if they take proper action for that purpose, whether the conditions which face the Empire at this time in respect of naval defence are grave. If we were in power we would endeavour to find that out, to get a plain unvarnished answer to the question; and if the answer to that question, based upon the assurance of the Government of the Mother Country and the report of the naval experts of the Admiralty, were such—and I think it would be such—as to demand instant and effective action by this country, then I would appeal to Parliament for immediate and effective aid, and if Parliament did not give immediate and effective aid I would appeal from Parliament to the people of the country. Then as to the permanent policy, I think the people have a right to be consulted. I do not know whether I have made my position clear, but I have done so according to my humble capacity. I think the question of Canada's co-operation upon a permanent basis in Imperial defence involves very large and wide considerations. If Canada and the other Dominions of the Empire are to take their part as nations of the Empire in the defence of the Empire as a whole, shall it be that we, contributing to that defence of the whole Empire, shall have absolutely, as citizens of this country, no voice whatever in the councils of the Empire? I do not think that such would be a tolerable condition. I do not believe that the people of Canada would for one moment submit to such a condition. Shall members of this House of Representatives—men representing 221 constituencies of the country—from the Atlantic to the Pacific—shall no one of them have some voice with regard to those vast Imperial issues that the humblest taxpayer in the British Isles has at this moment? It does not seem to me that such a condition would make for the integrity of the Empire, for closer co-operation in the Empire. Regard must be had to these far-reaching considerations. A permanent policy will have to be worked out, and when that permanent policy has been worked out and explained to the people of Canada, to every citizen in the country, then it will be the duty of any Government to go to the people of Canada to receive their mandate and to accept and act upon their approval or disapproval of the policy.

Canadian Mission to England.

The present Government assumed office on October 10, 1911, and met Parliament on November 17th following. It is hardly necessary to point out that there was no opportunity until after the close of the Session to visit Great Britain, or consult the Admiralty in any effective way. Shortly after the Session closed I went to England, accompanied by some of my colleagues, and for several weeks we had the opportunity from time to time of conferring with the British Government, and consulting with technical and expert advisers of the Admiralty, respecting the whole question of naval defence, and especially the conditions which confront the Empire at present and in the early future. I desire to express my warm

appreciation of the manner in which we were received by His Majesty's Government, who took us most fully into their confidence regarding great questions of foreign policy and defence, and who accorded to us all the relevant information at their disposal. A portion of this is, necessarily, of a very confidential character, which cannot be made public, but the important part will be communicated to the House in a document which I shall lay on the table this afternoon.

In considering the power of the British Empire to maintain that predominance upon the sea which is essential to its safety and to its very existence, it is clear that reference to the other naval forces of the world cannot be excluded. Such reference and comparisons are frequently made by all the Great Powers, and they do not imply anything unfriendly in the intention or in the spirit of other nations. Indeed, the most distinct reference to the naval power of Great Britain has been set forth in the preamble to the naval law of one great empire which has sprung to the front with amazing rapidity in the development of its naval forces in recent years.

The Admiralty Memorandum.

[Mr. Borden then submitted to the House the information received from His Majesty's Government, which, in the form of an Admiralty Memorandum, was published as a Parliamentary Paper, Cd. 6513.]

Mr. Borden proceeded: In this twentieth century of Christianity, in this age which boasts of its civilisation, the increasing tendency of nations to arm themselves against each other is not only regrettable but depressing and alarming. May the day soon approach when international differences will be settled by appeal to a tribunal established by international authority, and so constituted that its decrees will unfailingly command respect and obedience. But while war is the supreme arbiter between nations, we, to whose care this vast heritage has been committed, must never forget that we are the trustees of its security.

Naval Risks of the British Empire.

Do Canadians sufficiently realise the disparity between the naval risks of our Empire and those of any other nation? The armies of Continental Europe number their men by the million, not by the thousand. They are highly equipped and organised, the whole population have undergone military training, and any one of the countries is absolutely secure against invasion from Great Britain, which could not send an expeditionary force of more than 150,000 men at the highest estimate. Such a force would be

outnumbered by twenty to one by any of the great European Powers. This Empire is not a great military power, and it has based its security in the past, as in the present, almost entirely on the strength of its Navy. A crushing defeat upon the high seas would render the British Islands, or any Dominion, subject to invasion by any great military Power; loss of such a decisive battle by Great Britain would practically destroy the United Kingdom, shatter the British Empire to its foundation, and change profoundly the destiny of its component parts. The advantages which Great Britain could gain from defeating the naval forces of any other Power would be non-existent except in so far as the result would ensure the safety of the Empire. On the other hand, there are practically no limits to the ambitions which might be indulged in by other Powers if the British Navy were once destroyed or disabled. There is, therefore, grave cause for concern when once the naval supremacy of the Empire seems on the point of being successfully challenged.

The great outstanding fact which arrests our attention in considering the existing conditions of naval power is this. Twelve years ago the British Navy and the British Flag were predominant in every ocean of the world and along the shores of every continent. To-day they are predominant nowhere except in the North Sea. The paramount duty of ensuring safety in Home waters has been fulfilled by withdrawing or reducing squadrons in every part of the world, and by concentrating nearly all the effective naval forces in close proximity to the British Islands. In 1902 there were fifty-five British warships on the Mediterranean station; to-day there are nineteen. There were fourteen on the North America and West Indies station; to-day there are three. There were three on the South-east Coast of South America; to-day there is one. There were sixteen on the Cape of Good Hope station; to-day there are three. There were eight on the Pacific station; to-day there are two. There were forty-two on the China station; to-day there are thirty-one. There were twelve on the Australian station; to-day there are eight. There were ten on the East Indies station; to-day there are nine. To sum up, in 1902 there were 160 ships on foreign and Colonial stations against seventy-six to-day. Do not imagine that this result has been brought about by any reduction in expenditure, for the case is practically the reverse. Great Britain's total naval expenditure in 1902 was less than $152,000,000 (£30,400,000). For the present fiscal year it exceeds $220,000,000 (£44,000,000). Why, then, has the naval force of the Empire been so enormously reduced throughout the world, while at the same time the expenditure has increased nearly 50 per

cent.? For the simple reason that the increasing strength of other navies, and especially of the German Navy, has compelled Great Britain, not only to increase her Fleet, but to concentrate it in the vicinity of the British Islands; and there has been, of course, a substantial increase in the strength in Home waters. In short, the strain of meeting changed conditions has been so heavy and unceasing that, in spite of the largely increased expenditure and every possible exertion, the Admiralty has been compelled by the pressure of circumstances to withdraw or diminish the forces throughout the world which, in time of peril, safeguarded the security and integrity of the King's Dominions, and, in time of peace, were the living and visible symbol of the tie that unites all the subjects of the Crown.

THE WITHDRAWAL OF THE BRITISH FLAG.

It is neither necessary nor desirable in this place to debate or discuss the probability or imminence of war. The real test of our action is the existence or non-existence of absolute security. We cannot afford to be satisfied with anything less than that, for the risk is too great. It should never be forgotten that without war, without firing a shot or striking a blow, our naval supremacy may disappear, and with it the sole guarantee of the Empire's continued existence. I specially desire to emphasize this consideration, for all history, and especially modern history, conveys to us many grave warnings that the issue of great events may be determined, and often is determined, not by actual war resulting in victory or defeat, but by the mere existence of an unmistakable and pronounced naval or military superiority on either side.

The fact that trade routes, vital to the Empire's continued existence, are inadequately defended and protected by reason of the necessary concentration in Home waters is exceedingly impressive, and even startling. Even during the present year the battleships of the British Mediterranean Fleet, based on Malta, have been withdrawn and based on Gibraltar, in order that they might become more easily available for necessary aid in Home waters. The Atlantic Fleet, based on Gibraltar, has been withdrawn to the vicinity of the British Islands for the same reason. Under such conditions the British Flag is not predominant in the Mediterranean, and with every available exertion of the whole Empire it may be impossible to regain the necessary position of strength in that great highway before 1915 or 1916. Austria-Hungary, with only 140 miles of sea coast, and absolutely no colonial possessions, is building in the Mediterranean a formidable fleet of Dreadnoughts, which will attain its full strength in about three years, and which will be supported by strong battle-

ships of the pre-Dreadnought type, and by cruisers, torpedo craft, and other necessary auxiliaries. The Fleet of Italy in the same theatre will be even more powerful and more formidable.

The withdrawal of the British Flag and the British Navy from so many parts of the world for the purpose of concentration in Home waters has been necessary, but unfortunate. Our Navy was once dominant everywhere, and the White Ensign was the token of naval supremacy in all seas. Is it not time that the former conditions should, in some measure, be restored? Upon our own coasts, both Atlantic and Pacific, powerful squadrons were maintained twelve years ago. To-day the Flag is not shown on either seaboard. I am assured that the aid which we propose will enable such special arrangements to be consummated that, without courting disaster at home, an effective fleet of battleships and cruisers can be established in the Pacific, and a powerful squadron can periodically visit our Atlantic seaboard and assert once more the naval strength of the Empire along these coasts. I do not forget, however, that it is the general naval supremacy of the Empire which primarily safeguards the Oversea Dominions. New Zealand's battleship is ranged in line with the other British battleships in the North Sea, because there New Zealand's interests may best be guarded by protecting the very heart of the Empire.

THE GOVERNMENT PROPOSALS.

In presenting our proposals it must be borne in mind that we are not undertaking or beginning a system of regular and periodical contributions. I agree with the resolution of this House in 1909 that the payment of such contributions would not be the most satisfactory solution of the question of defence.

Upon the information which I have disclosed to the House, the situation is, in my opinion, sufficiently grave to demand immediate action. We have asked His Majesty's Government what form of temporary and immediate aid can best be given by Canada at this juncture. The answer has been unhesitating and unequivocal. Let me again quote it:—

"We have no hesitation in answering, after a prolonged consideration of all the circumstances, that it is desirable that such aid should include the provision of a certain number of the largest and strongest ships of war which science can build or money supply."

THREE BATTLESHIPS IMMEDIATELY.

Upon inquiry as to the cost of such a battleship we were informed by the Admiralty that it is approximately £2,350,000, including

armament and the first outfit of ordnance, stores, and ammunition. The total cost of three such battleships, which when launched would be the most powerful in the world, would be, approximately, $35,000,000, and we ask the people of Canada, through their Parliament, to grant that sum to His Majesty the King of Great Britain and Ireland and of the Oversea Dominions, in order to increase the effective naval forces of the Empire, to safeguard our shores and our sea-borne commerce, and to make secure the common heritage of all who owe allegiance to the King.

Those ships will be at the disposal of His Majesty the King for the common defence of the Empire. They will be maintained and controlled as part of the Royal Navy, and we have the assurance that, if at any time in the future it be the will of the Canadian people to establish a Canadian unit of the British Navy, these vessels can be called by the Canadian Government to form part of the Navy, in which case, of course, they will be maintained by Canada and not by Great Britain. In that event, there will, necessarily, be reasonable notice, and, indeed, Canada would not desire or suggest the sudden withdrawal of so powerful a contingent from any important theatre in which the naval forces of the Empire might be exposed to severe and sudden attack. In the meantime, I am assured that special arrangements will be made to give Canadians an opportunity of serving as officers in these ships.

The Question of a Canadian Navy.

Without intending or desiring to indulge in controversial discussion, I may be permitted to allude to British naval organisation. Obviously one could not make a very complete or thorough study of so great an organisation in a few weeks or even a few months, but during recent years, and especially during the past summer, I have had occasion to learn something of its methods, its character, and its efficiency, and I have good reason to conclude that it is undoubtedly the most thorough and effective in the world. There have been proposals, to which I shall no more than allude, that we should build up a great naval organisation in Canada. In my humble opinion, nothing of an effective character could be built up in this country within a quarter or, perhaps, half a century. Even then it would be but a poor and weak substitute for that splendid organisation which the Empire already possesses, and which has been evolved and built up by centuries of the most searching experience and the highest endeavour. Is there really any need that we should undertake the hazardous and costly experiment of building up a naval organisation especially restricted to Canada when upon just and self-respecting

terms we can take such part as we desire in naval defence through the existing naval organisation of the Empire, and in that way can fully and effectively avail ourselves of the men and the resources at the command of Canada?

Construction in the United Kingdom.

Where shall these ships be built? They will be built under Admiralty supervision in the United Kingdom for the reason that, at present, there are no adequate facilities for constructing them in Canada. The plant required for the construction of Dreadnought battleships is enormous, and it would be impossible at present to have shipbuilding in this country on such a scale. In any case, only half could be built in Canada, because the machinery for armour and guns would, necessarily, be constructed or manufactured in the United Kingdom. The additional cost of construction in Canada would be about twelve million dollars for three, and it would be impossible to estimate the delay. No one is more eager than myself for the development of the shipbuilding industries in Canada, but we cannot, upon any business or economic considerations, begin with the construction of Dreadnoughts, and especially we could not do so when these ships are urgently required within two or three years at the outside for rendering aid upon which may depend the Empire's future existence. According to my conception, the effective development of the shipbuilding industries in Canada must commence with small beginnings and in a businesslike way. I have discussed the subject with the Admiralty, and they thoroughly realise that it is not to the Empire's advantage that all shipbuilding facilities should be concentrated in the United Kingdom. I am assured, therefore, that the Admiralty are prepared in the early future to give orders for the construction in Canada of small cruisers, oil tank vessels, and auxiliary craft of various kinds. The plant required is relatively small as compared with that which is necessary for Dreadnought battleships, and such an undertaking will have a much more secure and permanent basis from the business standpoint. For the purpose of stimulating so important and necessary an industry we have expressed our willingness to bear a portion of the increased cost for a time at least. I see no reason why all the vessels required in future for our Government service should not be built in Canada—even at some additional cost. In connection with the development of shipbuilding I would not be surprised to see the establishment of a high class of engineering works, which will produce articles now imported and not at present manufactured in Canada. Therefore, although the sum which we propose to devote for necessary naval aid

at this critical juncture is to be expended in Great Britain, yet we believe that this step will result, under the conditions which I have described, in the very marked development of more than one industry in Canada, and that, even from a purely economic and material standpoint, the step has much to commend it.

A Canadian Token to the King.

These ships will constitute an aid brought by the Canadian people to His Majesty the King as a token of their determination to maintain the integrity of the Empire and assist in repelling any danger which may threaten its security. It is most appropriate that the opportunity should have come when the Crown is represented in Canada by His Royal Highness the Governor-General, who has rendered such valuable and eminent service to the State, and who takes so deep and splendid an interest in all that concerns the welfare and safety of every portion of His Majesty's Dominions. Canada is sending these ships to range themselves in the battle-line of the Empire with those of the Mother Country, Australia, and New Zealand. They will be three of the most powerful battleships in the world, and they will bear historic names associated with this country. Thus every Canadian will realise in seeing or reading of these ships that they are a gift in which he has participated, and that by their presence in the battle-line of the Empire he has freely taken a direct and distinct share in maintaining the Empire's safety.

No modern nation possessing a great seaborne commerce can afford to neglect its interests upon the high seas. Heaven forbid that in this country we should aid or abet any warlike or aggressive tendencies! This Empire will never undertake any war of aggression, and all the influences in Canada will assuredly be arrayed against any such course; but we know that war has come many times within the past fifty years without warning, like a thunderbolt from a clear sky, and thereby the power and the influence and the destiny of more than one nation have been profoundly affected. A naval war especially may come with startling suddenness, for these tremendous engines of war are always ready and prepared for battle. The security, indeed the very existence, of the Empire depends on sea power. When we are obliged to abdicate the seas, it may even be without war, but in fact the overwhelming force of the Empire's arteries will no longer pulsate, the blood will cease to flow in its veins, and dissolution will be at hand.

The Alternative to British Supremacy.

But if we should neglect the duty which I conceive we owe to ourselves, and if irreparable disaster should ensue, what will be our

future destiny? Obviously as an independent nation or as an important part of the great neighbouring Republic. What, then, would be our responsibilities, and what would be the burden upon us for a protection on the high seas much less powerful and less effective than that which we enjoy to-day? Take the case of one nation whose territory, resources, population, and wealth may fairly be compared with those in Canada. The naval estimates of Argentina for the four years from 1909 to 1912 inclusive amounted to $35,000,000 (£7,000,000). No information is available as to the exact proportion of the last-mentioned sum which has been appropriated for naval purposes, but it is understood that the far greater portion is for naval construction. It is safe, therefore, to estimate that during the past four years Argentina has expended for naval purposes not less than from $65,000,000 to $70,000,000 (£13,000,000 to £14,000,000). The Federal and State expenditure of the United States comprises a total outlay for armaments of between $250,000,000 and $300,000,000 (£50,000,000 and £60,000,000), or at the rate of $2·75 per head. Similar expenditure by Canada would mean an annual outlay of some $20,000,000 to $25,000,000, or between $80,000,000 and $100,000,000 during the same period.

It is apparent, therefore, that the aid which we propose to bring at this juncture is of a moderate and reasonable character. For forty-five years as a Confederation we have enjoyed the protection of the British Navy without the cost of a dollar, and I venture to submit my firm conviction that this assistance freely tendered by the people of Canada through their Parliament is due to their own self-respect.

Canada's Security in the Past.

So far as official estimates are available, the expenditure of Great Britain on naval and military defence for the provinces which now constitute Canada during the nineteenth century was not less than $400,000,000 (£80,000,000). Even since the inception of our Confederation, and since Canada attained the status of a great Dominion, the amount so expended by Great Britain for the naval and military defence of Canada vastly exceeds the sum which we are now asking Parliament to appropriate. From 1870 to 1890 the proportionate cost of the North Atlantic Squadrons which guarded our coasts was from $125,000,000 to $150,000,000 (£25,000,000 to £30,000,000). From 1853 to 1903 Great Britain's expenditure on military defence in Canada runs closely to $100,000,000.

The Committee of Imperial Defence.

I have alluded to the difficulty of finding an acceptable basis upon which the great Dominions co-operating with the Mother

Country in defence can receive and assert an adequate voice in the control and moulding of foreign policy. We were brought closely in touch with both subjects when we met the British Ministers in the Committee of Imperial Defence. That Committee is peculiarly constituted, but in my judgment is very effective. It consists of the Prime Minister of Great Britain and such persons as he may summon to attend it. Practically all the members of the Cabinet from time to time attend its deliberations, and usually the more important members of the Cabinet are present. In addition, naval and military experts and the technical officers of the various departments concerned are in attendance. A very large portion of the work of the committee is carried on by sub-committees, which often are composed in part of persons who are not members of the general committee itself, and who are selected for their special knowledge of the subjects to be considered and reported upon. The amount of work which thus has been performed during the past five or six years in particular is astonishing, and I have no doubt that it has contributed largely to the safety of the whole Empire in time of peril.

The committee is not technically or constitutionally responsible to the House of Commons, and thus it is not supposed to concern itself with policy. As so many important members of the Cabinet are summoned to attend the committee, its conclusions are usually accepted by the Cabinet, and thus command the support of the majority of the House of Commons. While the Committee does not control policy in any way, and could not undertake to do so, as it is not responsible to Parliament, it is necessarily and constantly obliged to consider foreign policy and foreign relations for the obvious reason that defence, and especially naval defence, is inseparably connected with such considerations.

A Canadian Minister in London.

I am assured by His Majesty's Government that, pending a final solution of the question of voice and influence, they would welcome the presence in London of a Canadian Minister during the whole or a portion of each year. Such Minister would be regularly summoned to all meetings of the Committee of Imperial Defence and be regarded as one of its permanent members. No important step in foreign policy would be undertaken without consultation with such representative of Canada. This means a very marked advance both from our standpoint and from that of the United Kingdom. It would give us the opportunity of consultation and therefore influence which hitherto we have not possessed. The conclusions and declarations of Great Britain in respect of foreign relations could not fail to be

strengthened by the knowledge that such consultation and co-operation with the Overseas Dominions had become an accomplished fact.

The Problem of Imperial Union.

No thoughtful man can fail to realise the very complex and difficult questions that confront those who believe that we must find a basis for permanent co-operation in naval defence, and that any such basis must afford the Overseas Dominions an adequate voice in the moulding and control of foreign policy. It would have been idle to expect, and indeed we did not expect, to reach in the few weeks at our disposal during the past summer a final solution of that problem, which is not less interesting than difficult, which touches most closely the future destiny of the Empire, and which is fraught with even greater significance for the British Islands than for Canada. But I conceive that its solution is not impossible, and however difficult the task may be, it is not the part of wisdom or statesmanship to evade it. So we invite the statesmen of Great Britain to study with us this real problem of Imperial existence. The next ten or twenty years will be pregnant with great results for this Empire, and it is of infinite importance that questions of purely domestic concern, however urgent, shall not prevent any of us from rising "to the height of this great argument." But to-day, while the clouds are heavy and we hear the booming of distant thunder and see lightning flashes above the horizon, we cannot and will not wait and deliberate until the impending storm shall have burst upon us in fury and with disaster. Almost unaided, the Motherland, not for herself alone, but for us as well, is sustaining the burden of a vital Imperial duty and confronting an over-mastering necessity of national existence. Bringing the best assistance we may, in the urgency of the moment, we come thus to her aid in token of our determination to protect and ensure the safety and integrity of this Empire and our resolve to defend on sea as well as on land our flag, our honour, and our heritage.

[Correspondence between the First Lord of the Admiralty and the Prime Minister of Canada was presented to Parliament subsequently to the delivery of Mr. Borden's speech (Cd. 6689). In a Memorandum of January 23, 1913, it was stated that the suggestion that the proposed battleships could be expeditiously built in Canada could not be "based on full knowledge of the question." Certain facts were then adduced, with the following conclusion: "Taking the above points into consideration, it is clear that it would be wholly unwise for Canada to attempt to undertake the building of battleships at the present moment." In a letter of

January 24th, referring to a suggested Canadian Fleet unit of one battle-cruiser, three "Town" cruisers, six destroyers, and three submarines, the First Lord gave the cost of this unit, at the prices current in 1909–10, when the Australian Agreement was made, as £4,407,151, and, as estimated in January, 1913, for vessels of the latest type, as £5,159,400. An important point in the letter was stated thus: "The Admiralty will, of course, loyally endeavour to facilitate the development of any practical naval policy which may commend itself to Canada; but the prospect of their being able to co-operate to any great extent in manning the units is now much less than it would have been at the time of the Imperial Conference of 1909."]

NUMBERS OF *PERSONNEL* OF THE PRINCIPAL NAVIES.

YEAR.	GREAT BRITAIN.	GERMANY.	FRANCE.	RUSSIA.	ITALY.	AUSTRIA-HUNGARY.	UNITED STATES.	JAPAN.
1902	121,870	33,542	53,247	62,709	26,948	9,391	37,426	30,412
1903	125,948	35,634	52,966	64,393	26,994	10,277	41,605	32,810
1904	130,490	38,128	52,559	69,856	26,994	10,469	45,398	33,541
1905	127,667	40,843	54,549	71,527	27,492	11,989	50,049	—
1906	127,431	43,654	57,108	59,822	28,000	13,099	50,295	39,682
1907	127,228	46,936	57,461	55,343	28,476	13,133	51,942	41,777
1908	127,909	50,531	57,035	44,949	29,571	14,053	54,867	46,443
1909	127,968	53,946	57,351	46,845	30,613	14,954	58,827	47,240
1910	131,000	57,373	58,595	46,885	30,613	16,148	61,890	44,311
1911	134,000	60,805	58,649	46,655	30,587	17,277	63,648	49,389
1912	137,500	66,783	60,621	52,463	33,095	17,581	64,780	51,054

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